Rock Products

with which is incorporated

CEMENT and ENGINEERING NEWS

Founded 1896

YOUR OPPORTUNITY— AND OBLIGATION

ALL agree there must be a return of incentive to capital investment, if business does not want to depend indefinitely on government subsidies, which entail more and more government regulation or regimentation.

IN the Hayden-Cartwright Road Act, approved by the President, June 18, the government has provided not only funds for highway construction but the incentive to all connected with the highway construction industry to make capital investments themselves.

FOR the new road act covers a program for three years, restoring the federal-aid feature that compels the various states to match federal funds with their own, and penalizes states which divert any considerable amount of their gasoline and motor vehicle tax money to other than highway financing purposes.

HERE then is an assured market for highway construction materials for three consecutive years, to an extent probably equaling almost any other three-year period; there need be no longer any uncertainty in regard to this factor in the construction materials market.

THE government, by another recently enacted law, will provide loans to private industry, up to $500,000, to finance plant rehabilitation and improvements—which gives the producer of road construction materials a great opportunity to take a major part in restoring prosperity to the capital goods industries, of which he is a part.

THIS is not only an *opportunity* for him to make those plant changes and improvements he has long contemplated, but hesitated to make because of all the various uncertainties; it is his *obligation* to make them, to avoid defeating the purpose of the highway act and all the other business recovery measures.

MOREOVER, the new federal money provided to promote housing and residential construction by loans to individuals through established agencies will not be used by present or prospective home owners unless an incentive to borrow and invest the loans is also provided them.

THE chief incentive is a steady job; and *you*, the producer of building materials, must help provide the steady jobs, not merely in your own operations, but by no longer delaying those purchases of equipment you know you have got to make; credit money multiplies rapidly when spending once begins; it's not merely the amount *you* spend; that same amount may be spent six or eight or more times in a year when once started on its way.

THE time has arrived when advising everybody to spend the money the government is trying its best to put into circulation is not the least effective; don't say, "You should spend for my product," but rather, "I am buying myself"—the most decisive reason why everyone else should start buying, for "actions speak louder than words."

—The Editor

Member A. B. C. (Audit-Bureau of Circulations)
Member A. B. P. (Associated Business Papers)

JULY 1934

The Oldest Publication In Its Field and the Recognized Authority

MEET THE MARION TYPE 381

TWO CU.YD. CLUTCH TYPE EXCAVATOR

A heavy duty, high capacity machine of modern design — built especially to meet present day excavating requirements on all types of large construction projects. « « The Marion Type 381 invites comparison with any other machine of similar size and capacity. Write for the new Bulletin describing this machine in detail. « «

THE MARION STEAM SHOVEL COMPAN

MARION, OHIO « « U. S. A.

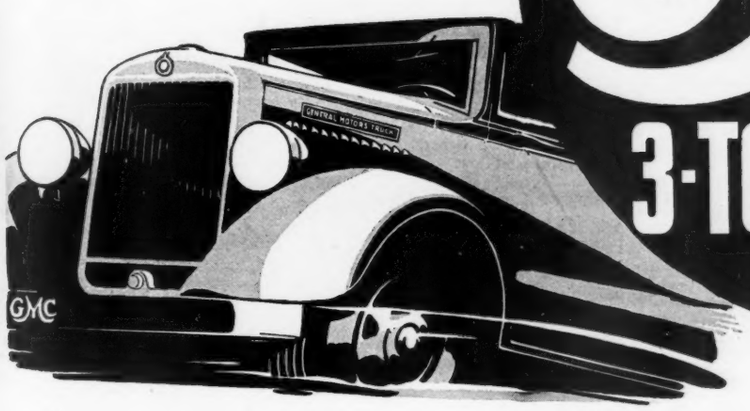
Send me the bulletin describing The Marion Type 381.

NAME _____ TITLE _____ FIRM _____

ADDRESS _____ CITY _____ STATE _____

TRUCK NEWS!

A NEW GMC 3-TON TRUCK



An Outstanding Value

Any 3-ton truck priced at only $925 would ordinarily be considered a real value. But here is a 3-ton truck bearing the GMC name, a truck with every feature that insures truck-built performance, economy and dependability—and priced at only $925. Such a truck value is truly outstanding.

Listed at the right are a few of the many modern improvements found in this newest addition to the GMC line. They combine to produce not only a unit of unusual ability in its capacity range, but also a unit fully comparable with many so-called heavier duty trucks. *Write for details today.*

$925

CHASSIS F. O. B. PONTIAC

Gross Rating—12,500 Lbs.

Payload Capacity—2½-3½ Tons

Wheelbases—142"—166"—184"

GMC Valve-in-Head Engine
69 H.P. 155 Ft. Lbs. Torque

Frame 8" Deep

Centrifuse Brake Drums

Needle-Bearing Universal Joints

Maximum Tire Size
8.25 20 10-ply Duals

Full Floating Rear Axle

GENERAL MOTORS TRUCKS AND TRAILERS
GENERAL MOTORS TRUCK COMPANY PONTIAC, MICHIGAN
Time Payments Available Through Our Own Y. M. A. C.

Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

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(Issued Monthly)

July, 1934

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Telephone Harrison 1422-23

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330 South Wells Street, Chicago, Illinois, U. S. A.

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PROTECTING the Receipt and Disbursing of Aggregates

For weighing aggregates at handling plants or wherever they are moved by truck, Fairbanks-Morse Type "S" Motor Truck Scales will be found to be the quickest and most accurate means of weighing. And weighing is sound business, both for insuring proper receipt and use of aggregates as well as an accurate basis for payment where contracts are on a tonnage basis.

Fairbanks Type "S" Scales represent the most advanced engineering practice in the design of scales for truck weighing. The jarring caused by starting or sudden stopping of trucks on the scale and unequal distribution of load on the scale platform do not result in errors in weighing.

Full data on the exclusive features of the Fairbanks Type "S" Motor Truck Scale may be obtained at your nearest Fairbanks-Morse branch or by writing Fairbanks, Morse and Co., 900 S. Wabash Ave., Chicago, Ill. And 40 principal cities—a service station at each house.

As the Leading Scale Manufacturer

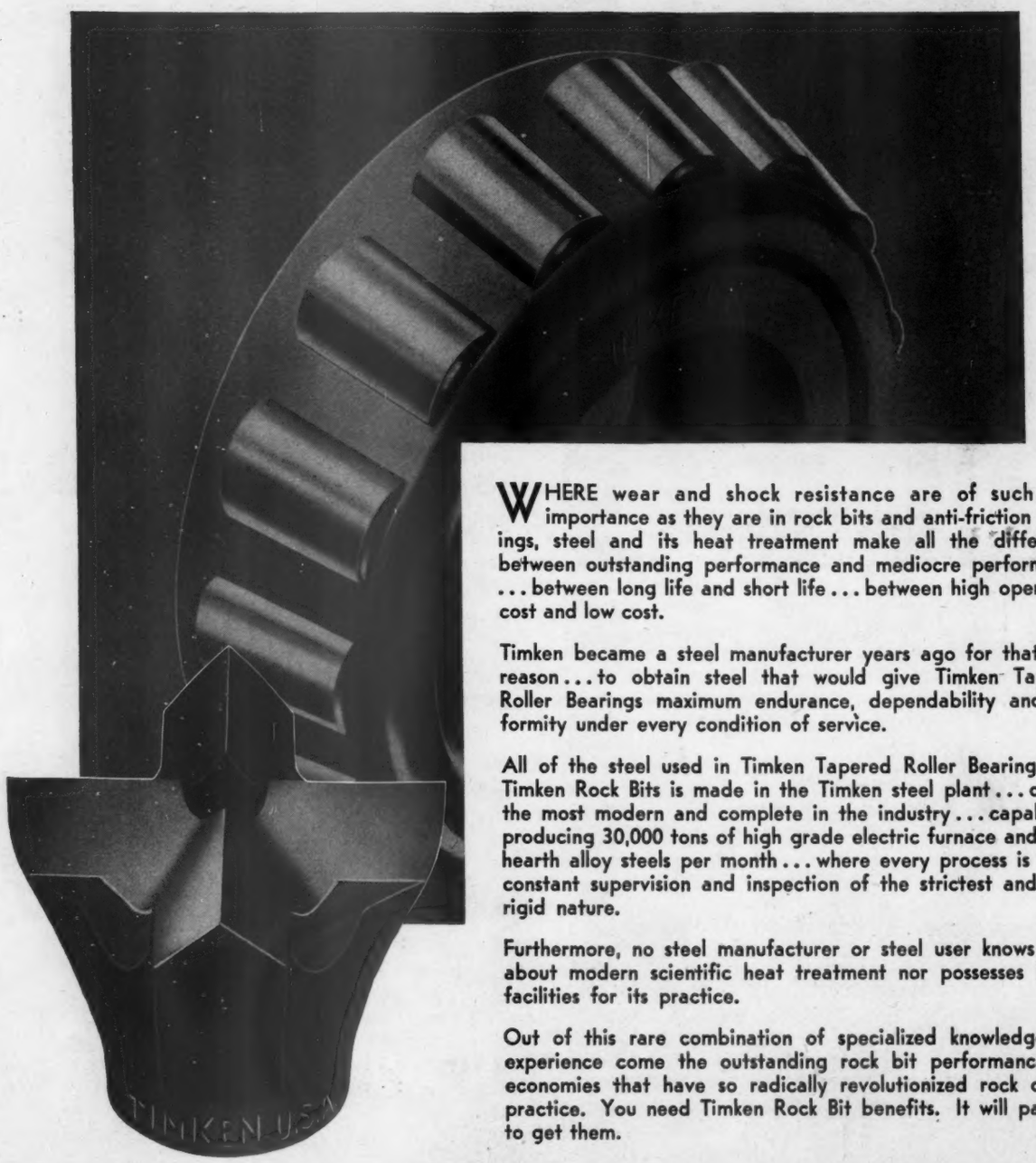
6684 of these Type "S" Motor Truck Scales have been placed in service since 1924. Fairbanks-Morse branches reporting on the service of these scales in 1931 show repair or replacement parts necessary on only one; overhaul without replacement on but six; field adjustments necessary on only nine.

Fairbanks Scales

PREFERRED THE WORLD OVER

6007 SA05.1

TIMKEN BITS
MADE BY THE MAKERS OF
TIMKEN BEARINGS



WHERE wear and shock resistance are of such vital importance as they are in rock bits and anti-friction bearings, steel and its heat treatment make all the difference between outstanding performance and mediocre performance . . . between long life and short life . . . between high operating cost and low cost.

Timken became a steel manufacturer years ago for that very reason . . . to obtain steel that would give Timken Tapered Roller Bearings maximum endurance, dependability and uniformity under every condition of service.

All of the steel used in Timken Tapered Roller Bearings and Timken Rock Bits is made in the Timken steel plant . . . one of the most modern and complete in the industry . . . capable of producing 30,000 tons of high grade electric furnace and open hearth alloy steels per month . . . where every process is under constant supervision and inspection of the strictest and most rigid nature.

Furthermore, no steel manufacturer or steel user knows more about modern scientific heat treatment nor possesses better facilities for its practice.

Out of this rare combination of specialized knowledge and experience come the outstanding rock bit performance and economies that have so radically revolutionized rock drilling practice. You need Timken Rock Bit benefits. It will pay you to get them.

THE TIMKEN ROLLER BEARING COMPANY, CANTON, OHIO

TIMKEN BITS

"I ~~HOPE~~ KNOW I PURCHASED THE RIGHT WIRE ROPE"

A SILVER STRAND ELIMINATES DOUBT

IN THE selection of Wire Rope—the difference between "know" and "hope" is frequently the difference between economy and needless cost. There is never a doubt, as far as Wire Rope quality is concerned—or economy either—when a Silver Strand governs choice. Monitor Silver Strand Wire Rope is made exclusively by the American Steel & Wire Company—the largest manufacturers of Wire Rope in the world—and service records prove it superior in wear, strength and endurance. Perfectly constructed of the highest quality steel—and with abrasion resisting factors—it is waiting to serve you—to substitute "know" for "hope" in your next Wire Rope order.

AMERICAN STEEL & WIRE COMPANY

MONITOR

SILVER STRAND WIRE ROPE

1831  1934

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SUBSIDIARY OF UNITED STATES STEEL CORPORATION
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WHERE'S *your* PAY ENVELOPE?

Profit — where does it come from? It comes from the savings you can make by doing things better at lower cost, in less time than was figured.

Are we right? We are!

Perhaps Cordeau will help you. Cordeau-Bickford is an insensitive fuse which acts as a powerful detonator upon each cartridge in the same charge. Thus each cartridge has the added force of a primer cartridge, and gives more work.

With Cordeau you can connect each hole, and fire the entire blast at one time, yet so planned as to secure relief of burden: more work from your explosives with better control of fragmentation.

Cordeau also simplifies loading, and because it is insensitive to ordinary shock and must be detonated, its use reduces hazard.

Yes — perhaps you can use it. Why not send for the Cordeau book? It's free — to executives.

CORDEAU
DETONATING FUSE
BICKFORD

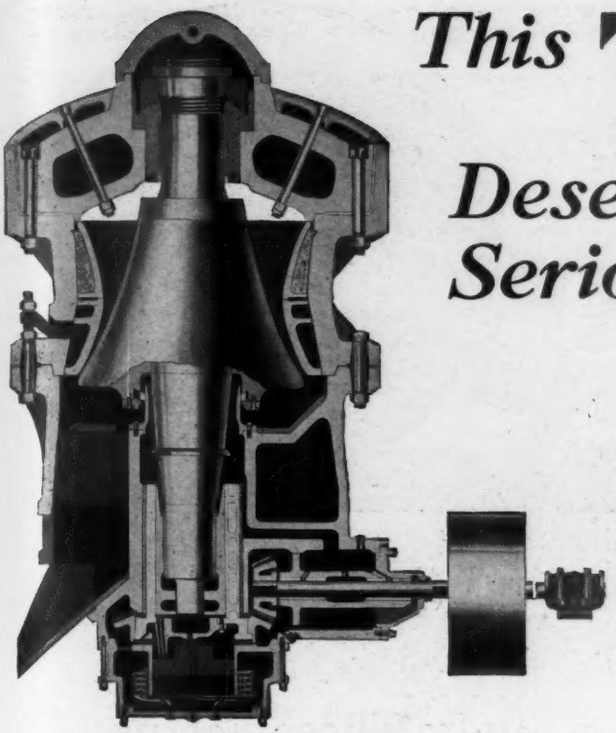
THE ENSIGN-BICKFORD COMPANY

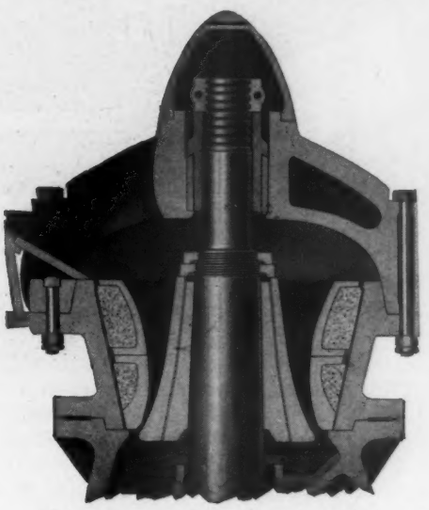
Simsbury, Connecticut

CB-32

This TZ REDUCTION CRUSHER

Deserves Your Serious Consideration





A No. 6 K Gates Gyratory Crusher Fitted with the New Bell Head and Concaves

It enables you to secure increased output of small sizes at lowest cost per ton with minimum waste of fines, because it has no choking point. It has an adjustment range of fifty per cent and is adaptable to service in the hardest materials. It is made in six sizes to meet all requirements. Ask for Bulletin 2110.

TRAYLOR TYPE BH GYRATORY CRUSHER

This is available with Traylor Bell Head and Curved Concaves. This means greatly increased capacity to sizes smaller than the minimum setting of standard gyratory machines. The output will cost less per ton per horse-power and less expense for replacement. Ask for bulletin 111.

Both the TZ and BH machines have all the patented features of the famous Traylor Bulldog Gyratory Crusher.

GET DOUBLE THE OUTPUT OF ANY OLD GYRATORY WITH TRAYLOR ORIGINAL PATENTED BELL HEADS AND CONCAVES

The capacity of your old Gates, Austin, McCully or other Gyratory Type Crusher —even though old, can be increased 100% at closer settings without using any more power; choking is eliminated, setting may be half the present minimum; crushing surfaces of head and concaves wear uniformly; product is more uniform.

Get full details from our nearest representative.

•

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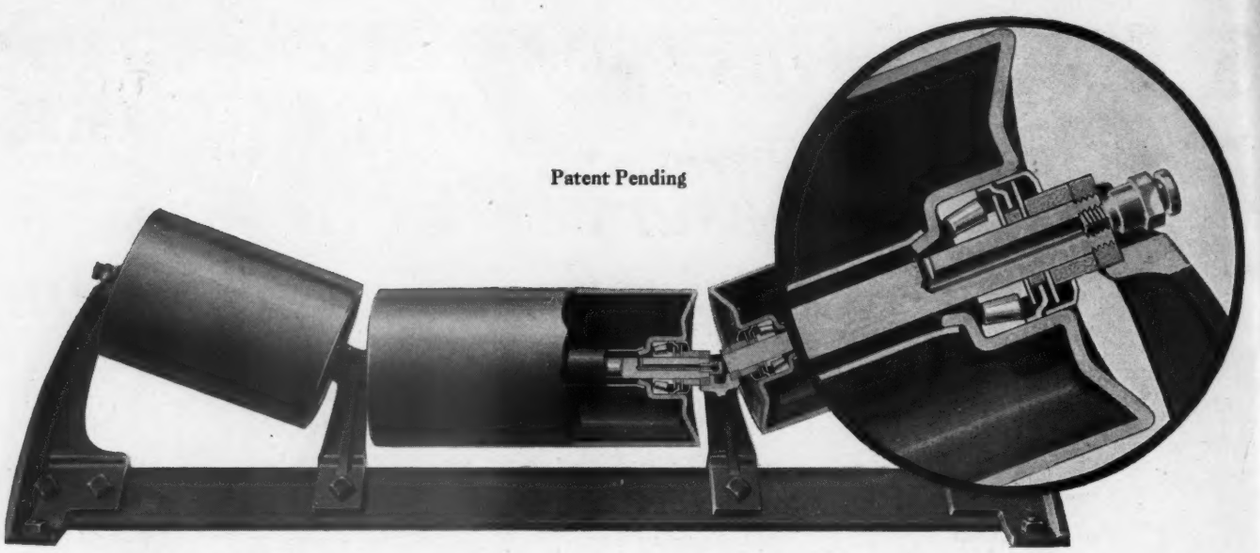
Patent Pending



Look Again...

A close scrutiny of the magnified section (above) of the Jeffrey Reliance steel Belt Idler and a careful study of its many outstanding features (right) will readily show you why so many large companies in the Rock Products Industry are turning to Jeffrey Belt Conveyors for satisfactory and economical service.

Long experience in designing and manufacturing belt conveyors has enabled Jeffrey to build into the Reliance Idler every feature essential to provide belt protection, long, reliable service and power economy.

Because of the universal design of this Idler, its application is extended to all fields where belts are called upon to solve bulk material handling problems.

Jeffrey Reliance Idlers are available in three types: Troughing, Picking Belt and Flat Belt with three styles of return hangers: Bottom Hanging, long or short side hangers. Furnished with 4", 5" or 6" diameter rolls for belt widths up to 60".

Complete information covering this Jeffrey Reliance Belt Idler will be sent on request. Write today.

Study These Features:

- Heavy steel end, electric welded to tube, shaped to deflect dirt away from grease seal
- Outer shells of the rolls are high quality steel tubing
- Double Labyrinth grease seal
- Die forged Hexagon Head
- Timken Roller Bearings
- Flow of grease is always outward through bearings
- Full diameter shaft—not weakened by shouldering
- Alemite fittings
- One piece die straightened malleable iron End Stands
- Inverted "V" self-cleaning base
- Interchangeable rolls, easily removed

The Jeffrey Manufacturing Company

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Jeffrey Manufacturing Company, Ltd., of Canada
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Jeffrey Products

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Sprocket Wheels—Gears
Elevators—Conveyors
Trolley Conveyors
Portable Loaders
Coal and Ashes Handling Equipment
Electric Vibrating Screens, Feeders and Conveyors
Sand and Gravel Handling, Washing and Screening Equipment
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Locomotives

JEFFREY MATERIAL HANDLING EQUIPMENT

A Bit Dresser

that revolutionizes blast-hole bit sharpening

NOW you can have a real, mechanical, bit dresser that gives you sharp, accurately-shaped, clean-cutting, blast-hole bits that will speed up your drilling 30 to 50% . . . a dresser that cuts sharpening costs, increases capacity, produces uniform, efficient shapes to meet the problems of your formation.

An upsetting die, delivering 500 blows per minute, shapes the penetrating edge and crushing surface. A radial hammer, striking with equal speed, forms the reaming edge and brings the tool to accurate size. Sharpens both large or small bits . . . 5- to 12-inch diameter. Even the largest bits require only two or three heats . . . usually not more than two for dressing, one for tempering. The work is easily handled by two men . . . there is no hand-hammering; waste of steel by oxidation and cutting away is practically eliminated.

These things mean economy in the shop . . . but the most important economy is the big savings you will experience in using these accurate, uniform, sharp bits on your drills. Your drills will cut 30 to 50% faster; most of your fishing and stuck-bit troubles will be eliminated; you can use the large-hole blasting technique that reduces rock preparation costs.

Installation of a Bucyrus-Armstrong Bit Dresser is an economy that shows prompt profits wherever there is steady work for more than one drill. In hard formations, even where only one drill is required, one of these bit dressers will often show attractive savings. Ask for the new bulletin.

Bucyrus-Erie Company

South Milwaukee, Wisconsin

BLAST HOLE DRILLS • 26—rated for 1600 lb. tools . . 6-inch holes • 29—rated for 2200 lb. tools . . 6 or 8-inch holes • 29-T—rated for 3000 lb. tools . . 9, 10, or 12-inch holes.

BIT DRESSERS • No. 8 . . Up to 6-inch bits • No. 12 . . Up to 12-inch bits.

BUCYRUS-ERIE CO., South Milwaukee, Wis.

Gentlemen: Send me full information on Bucyrus-Armstrong Bit Dressers.

Name .....

Occupation .....

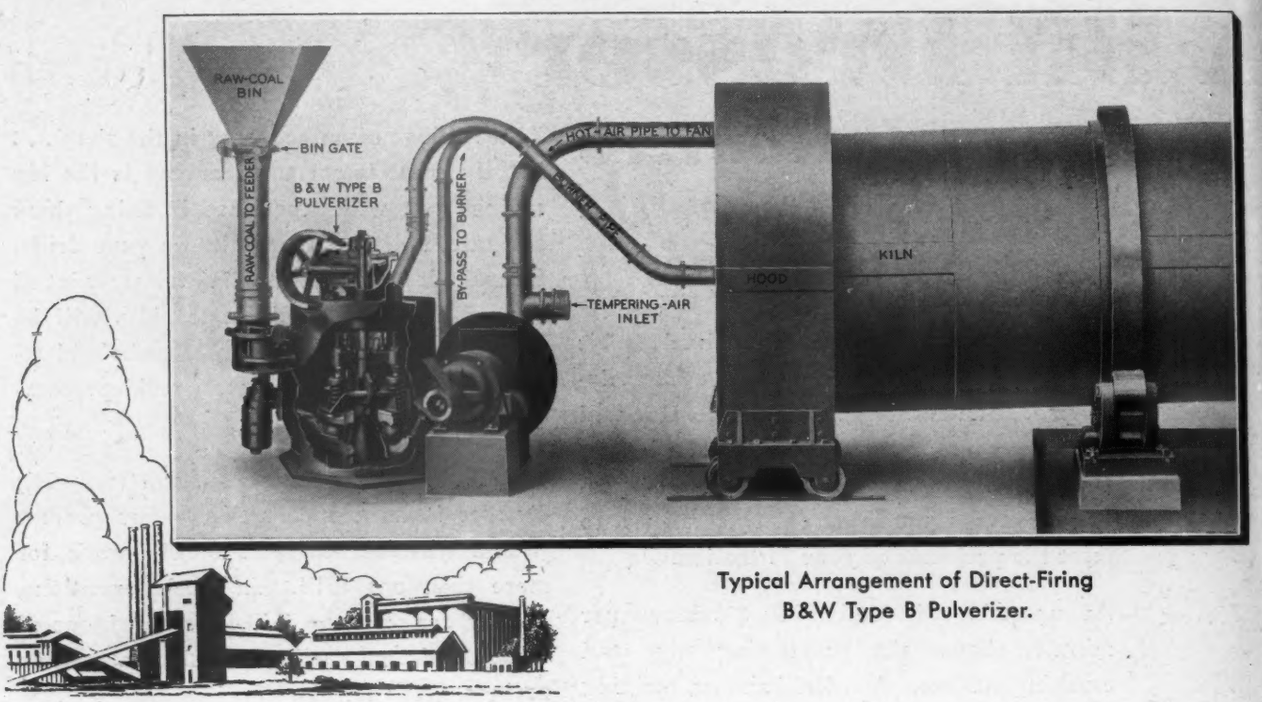
Firm .....

Address .....

Also on Blast Hole Drills ☐ Drill Tools ☐

BUCYRUS ARMSTRONG *Bit Dressers*

It will also pay you to analyze your entire drilling set-up and consider the extensive economies possible in preparation of your rock or ore, with complete modernized equipment. Startling savings can be effected by use of the revolutionary Bucyrus-Armstrong drills, 26, 29, or 29-T.



Typical Arrangement of Direct-Firing B&W Type B Pulverizer.

What Price Coal Plant?

Direct firing of kilns with B&W Type B Pulverizers eliminates driers and furnaces, dust nuisances common to coal plants, much re-handling of coal, motors, and other accessories. It also offers greater kiln efficiency by reason of more uniform feed, better mixing of coal and air, and avoidance of pulsations. The principle of direct firing has long been recognized as correct; its acceptance awaited the development of a reliable pulverizer.

The B&W Type B Pulverizer with Integral Feeder and Blower was developed especially for such service. It is a sturdy, ball-bearing-principle pulverizer having a high degree of reliability. It has a low rate of wear of the grinding parts and maintains a uniform high fineness throughout the life of the grinding parts. It is economical to operate.

Let us show you how, with this pulverizer, you can reduce the cost of burning. Write for details, or, better still, ask to have a B&W Representative call. No obligation, of course. The Babcock & Wilcox Company, 85 Liberty Street, New York, N. Y.

BABCOCK & WILCOX

F 277

HE EVIDENCE SHOWS FASTER

split second CONTROL

We'll be glad to show you a P&H shovel with Split Second Control. Seeing one at work is the way to get the evidence of what P&H can do for you.

Production for Highway Construction Jobs

THERE'S something satisfying about the way these new P&H shovels tear into a job . . . something that makes you take off your hat! Their speed is impressive. There's no loss of time, no waste motion. The extra power makes loads seem lighter. Special shock absorbing construction smooths out punishing shocks. All these improvements are summed up in Split Second Control to give you greater yardage at lower cost.

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Established 1884

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Warehouses and Service Stations:

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P&H

the 50th year

Excavators . . . Cranes . . . Hoists . . . Arc Welders

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A tough screening condition?
...let Roebling help you meet it

MAKING WIRE to meet exacting requirements has been Roebling's specialty for over 90 years.

It makes strong, tough steel wire to withstand punishing wire rope service. 80,000 miles of its famed open-hearth steel bridge wire will be spun into huge 36½ inch main cables for San Francisco's new Golden Gate Bridge. Its wire products are used where stamina and durability must be certain...on great air transports, on battleships, on Zeppelins, on sky-scraper elevators.

You get the benefit of this unequaled experience in wire making when you use Roebling Wire Screen.

Why not take advantage of this experience. Let Roebling cooperate with you in your effort to lower screening cost. It is confident that it can meet your most exacting screen requirements, as to efficiency or resistance to vibration or abrasion.

We invite your inquiry regarding our product and our service.

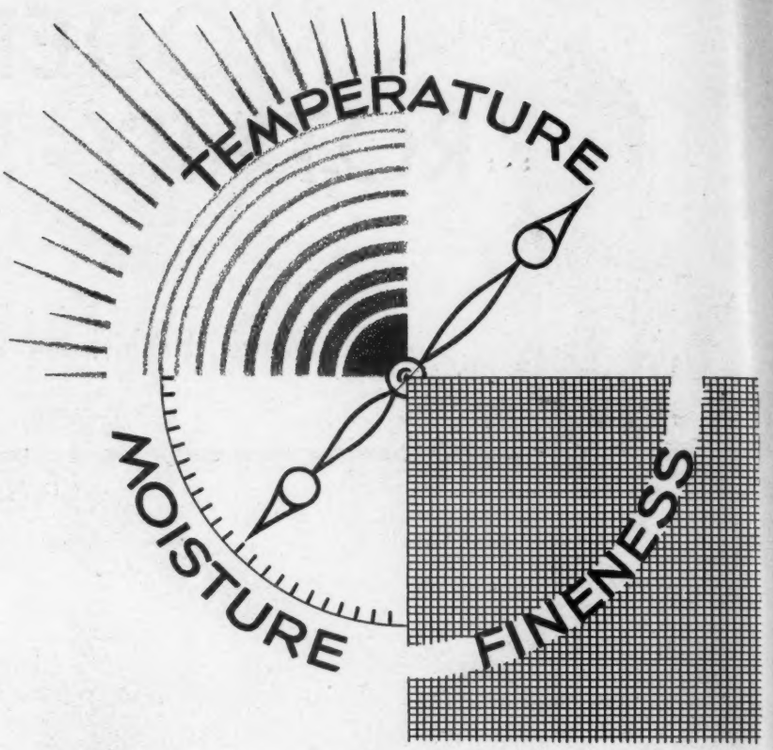
JOHN A. ROEBLING'S SONS COMPANY
TRENTON, N. J. *Branches in Principal Cities*

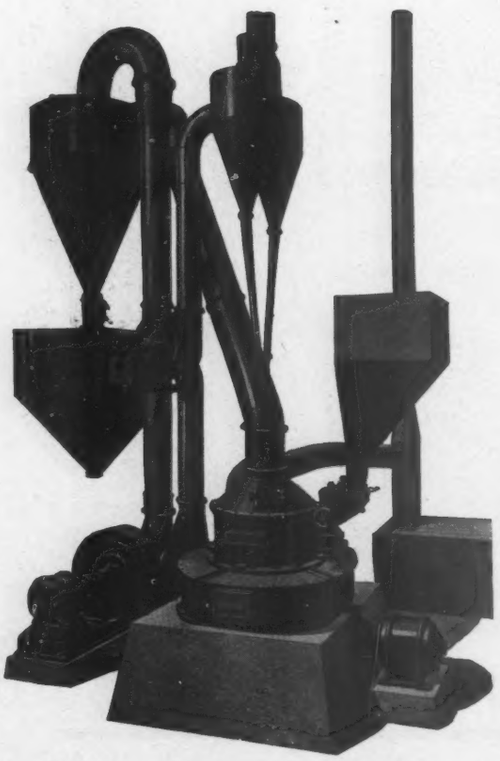
ROEBLING *Wire Screen*

TRADE JERSEY MARK

ROEBLING — MAKERS OF WOVEN WIRE FABRICS FOR OVER HALF A CENTURY

THREE POINT CONTROL





GOVERNING the quality of your product—now more important than ever because of today's exacting specifications—is easily accomplished with the Raymond Roller Kiln Mill.

FINENESS is regulated by the new whizzer air separator—an outstanding improvement in pulverizing equipment—which gives any desired degree of classification from coarse grind up to 99% through 325-mesh or better, a most efficient method of pulverizing various rock products in custom grinding plants.

DRYNESS of the finished product is determined by the air-drying system which evaporates the moisture to any required percentage during the pulverizing process, eliminating separate dryers and assuring a fine, dry, free-flowing material. This is the modern method of calcining gypsum and performing many other "drying-in-the-mill" operations.

TEMPERATURE control is important in many processes, where the product is sensitive to extreme heat. Delicate materials can be handled in the Kiln Mill without danger of discoloring or "burning" as the controlled heat supply is held uniform, and overheating is prevented because of the moisture always present in the system.

RAYMOND Roller Mills include many advanced features that insure highly profitable production. Tell us your requirements in pulverizing, drying, separating and dust collecting. Our 46 years' experience are at your service.

ORIGINATORS OF AIR SEPARATION
PIONEERS OF PULVERIZING
SINCE 1887

RAYMOND BROS. IMPACT PULVERIZER CO.

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14 Ton, Plymouth Diesel Locomotive used in construction and switching at New Lake Charles, La., Plant of Mathieson Alkali Works, Inc.

This latest addition to the world-famous line of Plymouth Locomotives is not only NEW but is THOROUGHLY PROVED on this and other tough assignments in construction or plant switching service.

Note these outstanding Plymouth features:

- Welded slab steel frames . . . unbreakable.
- Semi-Elliptic, cross-equalized, three point spring suspension.
- Timken tapered roller bearings.
- Rugged six-cylinder Caterpillar Diesel engine.
- Plymouth experience.

Your bulletin is ready covering the size Plymouth Diesel YOU are interested in —4 to 60 ton. Write for it.

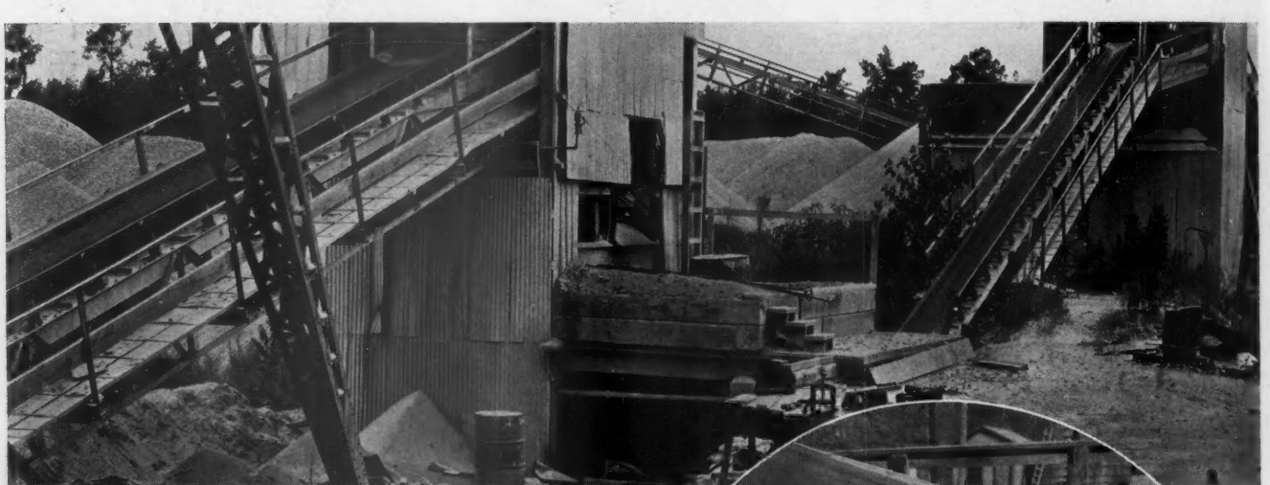
PLYMOUTH

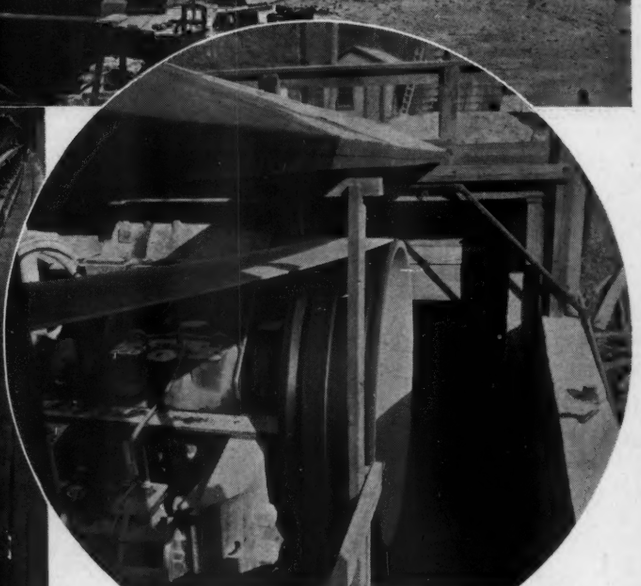
» GASOLINE » » DIESEL »
GAS ELECTRIC DIESEL ELECTRIC

LOCOMOTIVES

PLYMOUTH LOCOMOTIVE WORKS, PLYMOUTH, OHIO, U. S. A.

TREAT 'EM ROUGH
but even a champion shouldn't be fouled . . .





For steady operation and lowest possible costs, investigate Highflex —the Goodrich transmission belt which has become the acknowledged leader for rock products service.

TOP—*Goodrich Conveyor Belts have shattered all endurance records. Made to withstand the most punishing service they do their work smoothly, year in and year out, requiring little attention even when called upon to operate in severe climates—exposed to all weathers.*

BOTTOM—*To insure minimum handling cost per ton, be sure to investigate Goodrich Conveyor Belts. For infrequent repairs, uninterrupted service and prolonged belt life they have no equal.*

Goodrich

. . . THEY LIKE IT!

YOU don't need to pamper Goodrich Conveyor Belts. Always famous for toughness, these belts now have 14 additional improvements . . . it is our belief they are the longest-lived belts ever made.

But no belt can do its best nor deliver your full money's worth if it's the wrong belt for the job it is doing. To get the most out of your belt at the lowest cost per ton, belt width, number of plies, duck weight, method of joining, thickness and grade of covers, must be engineered to the handling you have to do. Volume, temperature, specific gravity of the load must be considered. Speed and incline of travel must be studied. Condition of pulleys, idlers, trippers, take-up equipment should be checked.

Then and only then can the right belt for that job be selected. This is the sort of belt engineering Goodrich can give you, based on years of study covering thousands of conveyor belt installations for almost every conceivable product.

In the one item of changing belt widths, Goodrich has been able to reduce investment and maintenance for many buyers. That can't always be done, of course, but the point is—don't take standard specifications for granted—make use of Goodrich experience the next time you invest in belt. It's almost certain to save you money. The B. F. Goodrich Rubber Company, Mechanical Rubber Goods Division, Akron, Ohio.

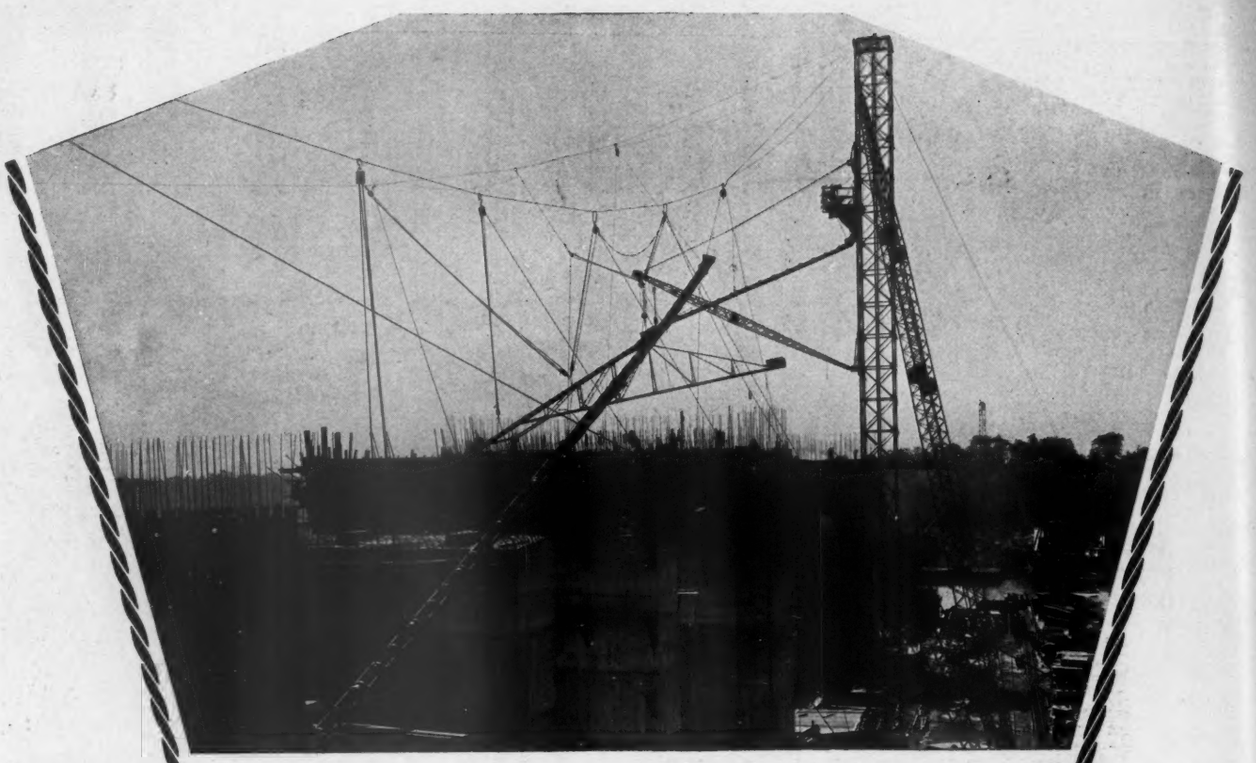
ALL *products problems* IN RUBBER

Properly engineered to the job, as Goodrich Belts are, these belts handle greater tonnage, last longer, require less attention.

GOODRICH MECHANICAL RUBBER GOODS FOR THE ROCK PRODUCTS INDUSTRY INCLUDE:

- *Conveyor, Elevator and Transmission Belting.*
- *Multiple-V Belts.*
- *Air, Water, Fire, Steam, Suction and Cement Discharge Hose.*
- *Rubber Lining for Ball Mills.*
- *Chute Lining.*
- *Dredging Sleeves.*
- *Packing . . . and*
- *A Complete Line of Miscellaneous Rubber Items.*

Conveyor Belting



Be Safe with WILLIAMSPORT TELFAX *marked rope*

On every construction job, the specter of accident is ever present. Williamsport sensed this many years ago and as a result the Telfax system of tape marking was born. It is today the exclusive safety sentinel of Wire Rope; guarding you against possible substitution of the wrong tensile strength—a most important factor in the use of Wire Rope.

That is not all—Good wire rope of *any* tensile strength and construction must have *uniformity in every wire.*

Williamsport method of fabricating and wire drawing insures this.

Let us tell you more about it—Write us—permit us to quote you on your very next requirement.

WILLIAMSPORT WIRE ROPE COMPANY

Main Office and Works:
Williamsport, Pa.

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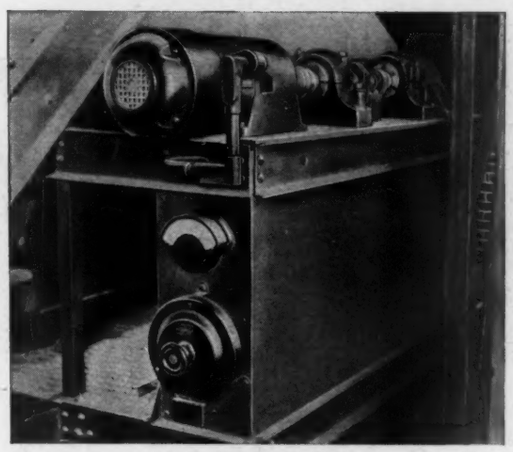
TO CUT INSTALLATION COST SAVE SPACE REDUCE MAINTENANCE

....use G-E GEAR-MOTORS

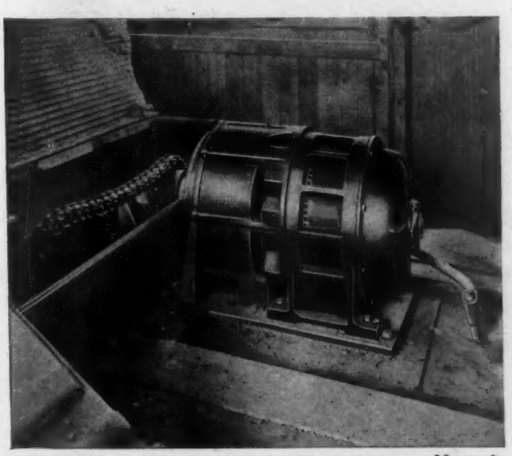


Here's a totally enclosed, fan-cooled, adjustable-speed gear-motor direct-connected to a screw conveyor feeding a kiln in a mid-western plant

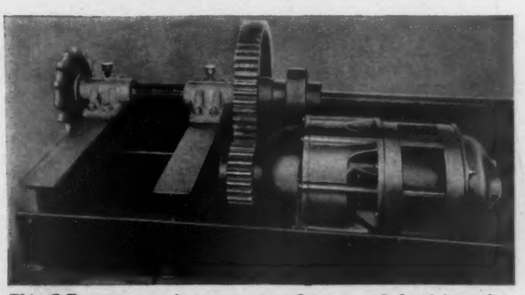
Compact, efficient drives for your low-speed machines

G-E gear-motors will deliver full rated power from the output shaft at the low speed you want. You can connect them directly to your machines, or use simple chain, belt, or gear drives. Thus, you eliminate complicated back gearing or countershafts, save space, reduce installation cost, and cut maintenance.

Gear-motors combine the economies of normal-speed motors with those of accurately cut helical gears running in oil. They are available, in standard a-c. and d-c. voltages, from 1/6 to 75 hp. You'll find them smooth-running, dependable, long-lived—the kind of a drive that will help you save money.



This 133-rpm. gear-motor drives a 2-ton pug-type cold-amesite mixer in a New York rock-products plant



This G-E gear-motor is gear connected to an asphalt-mixing plant in Cleveland, Ohio

This booklet is full of useful information on G-E gear-motors . . . types and sizes available . . . where to use them . . . installation photographs. Send coupon for your copy

GENERAL ELECTRIC

SEND FOR COMPLETE INFORMATION

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Please send me a copy of your handy booklet, G-E GEAR-MOTORS, GEA-1437B.

Name.....

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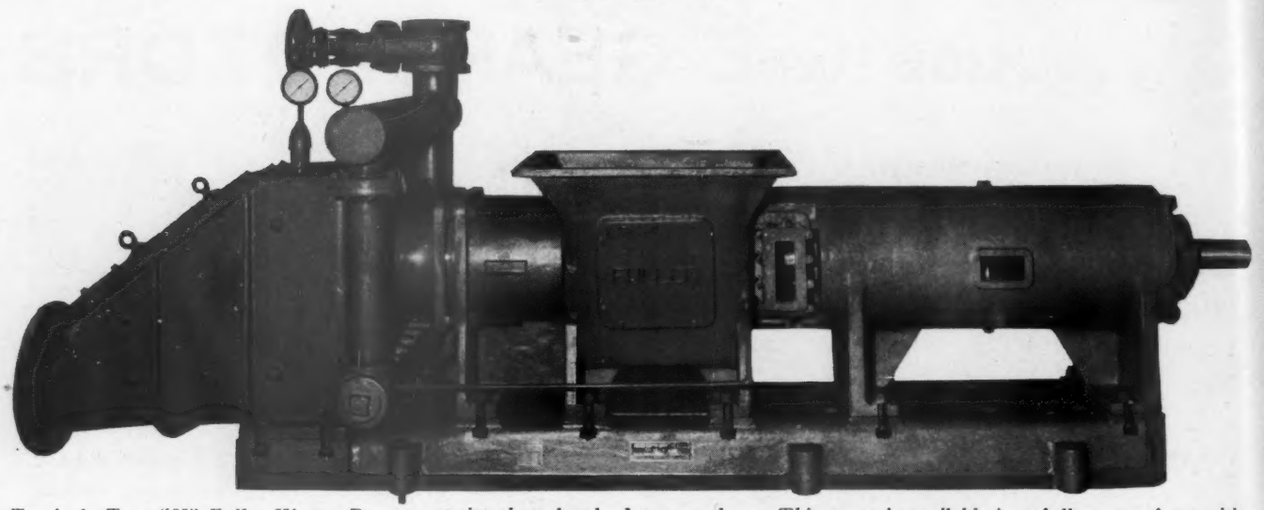
An Improved
FULLER-KINYON PUMP
TYPE H



Ten-inch, Type "H" Fuller-Kinyon Pump, capacity three hundred tons an hour. This pump is available in a full range of capacities in stationary and portable types for withdrawing material from silos.

This new bulletin fully illustrates the many uses of Fuller-Kinyon Systems in cement and other grinding mills. We believe it will suggest new short-cuts to greater economy in handling pulverized materials.

The operating economy of this new pump is the result of many years of practical experience in the handling of pulverized materials. There is nothing experimental about it. Its mechanical improvements have been thoroughly tried under severe service conditions.

These are the new features which make it the most economical conveyor per ton of material handled: 1. Low-pressure air supply, with stable operation under all load conditions. 2. Each size has an increased capacity range. 3. The pump adapts itself automatically, with minimum power input, to variations in the rate of feed. 4. The pump seal is automatically variable to the minimum density, thereby reducing both power and wear. 5. The parts are adequately protected against wear and the design minimizes danger from tramp iron. 6. Automatic lubrication, with the correct amount of oil circulation through the bearings, regardless of oil level in the reservoir, which is an integral part of the bearing assembly. 7. The screw is removable through the front wall of the check-valve body, without disturbing the bearings or any other parts. 8. Unitary bearing assembly prevents future misalignment.

Pulverized Material Feeders and Batchers

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STATIONARY and PORTABLE **FULLER-KINYON** ***CONVEYING SYSTEMS***

3 FRANK QUESTIONS *about* WIRE ROPE SEIZING

1. WHY DO ARTISTS HATE TO PICTURE IT?

2. WHY DO SOME MANUFACTURERS HATE TO PICTURE IT?

3. WHY DOESN'T TRU-LAY REQUIRE IT?

Everyone who has ever handled *non*-preformed wire rope knows that, when cut, it requires seizing. Yet how many manufacturers of *non*-preformed wire rope show illustrations of seized ends in catalogs or other advertisements? For one thing, seizings are "eyesores" to artists who produce the illustrations.

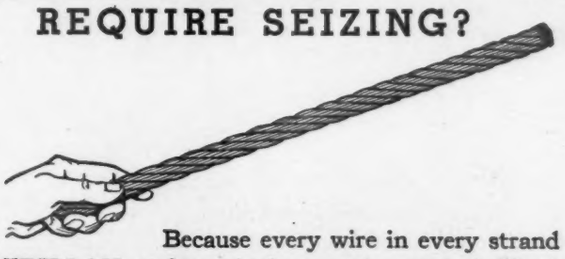
1. WHY DO ARTISTS HATE TO PICTURE SEIZING?

Well, artists are artists. They have a natural pride in good-looking pictures. No artist would draw a picture of a good-looking woman and then, as a finishing touch, put a bandage around her throat. Yet, to put the finishing touch to any picture of any *non*-preformed wire rope end, seizings *should be shown*. Otherwise it is an idealized picture, conveying the impression that the rope is preformed.

2. WHY DO SOME MANUFACTURERS HATE TO PICTURE SEIZING?

Because any wire rope which requires seizing has *internal tension*. It is never relaxed. Strands and wires have a constant tendency to straighten out—to "explode" as a watch spring does when released. Internal tension causes early fatigue. Naturally, no maker of *non*-preformed rope cares to call attention to these facts.

3. WHY DOESN'T TRU-LAY REQUIRE SEIZING?



Because every wire in every strand of TRU-LAY preformed wire rope is *relaxed*. The helical shape of wires and strands practically eliminates internal tension and friction. The tendency to straighten out—to unravel—to "explode"—is absent. When you cut TRU-LAY, wires and strands lie naturally in position—no seizing is required.

TRU-LAY preformed wire rope is made in all sizes, grades, constructions and lays. It costs a little more, of course, but *in the long run* it costs far less. May our engineers consult with you? Write for detailed information.

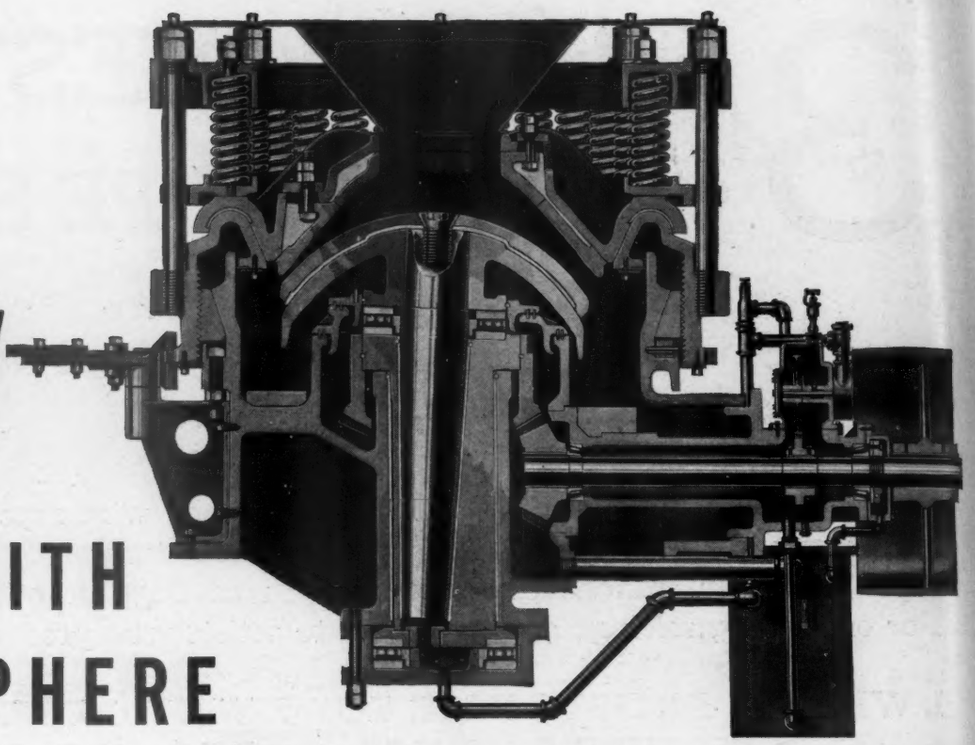
FROM AN ACTUAL PHOTO

AMERICAN CABLE COMPANY, Inc.
WILKES-BARRE, PA.

District Offices:
Atlanta · Chicago · Denver · Detroit
New York · Philadelphia · Pittsburgh
Houston · San Francisco

TRU·LAY *Preformed** Wire Rope

*PREFORMING IS A PATENTED MANUFACTURING PROCESS APPLICABLE TO ANY TYPE, GRADE, CONSTRUCTION AND LAY OF WIRE ROPE—WITH THE RESULT OF GREATLY INCREASING ITS SERVICE



Why IS THE TELSMITH GYRASPHERE EQUIPPED WITH A SPHERICAL HEAD?

Here are two identical pieces of rock— A and B Lay A against an anvil, recessed like a cone  and crush it with a conical head  It breaks on a vertical line, parallel to the axis of the cone; and the result is two fragments, like this—  Now lay the other piece B against an anvil, hollowed out to a spherical surface  and crush it with a spherical head  The piece B breaks (to conform with its spherical background) into four pieces, like this—  In one case you make splinters— in the other case you make cubes. Splinters make weak concrete and poor road material—cubes make the kind of aggregate that careful engineers specify. Telsmith Gyrasphere, with its spherical head, not only turns out an excellent cubical product but crushes finer. Get complete details—write for Bulletin Y-11. Y-3

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130 South 15th St. Philadelphia, Pa.
1109 Statler Bldg. Boston, Mass.
Clark & Freeland, Inc. Baltimore, Md.
412 Westinghouse Bldg. Pittsburgh, Pa.
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SMITH ENGINEERING WORKS
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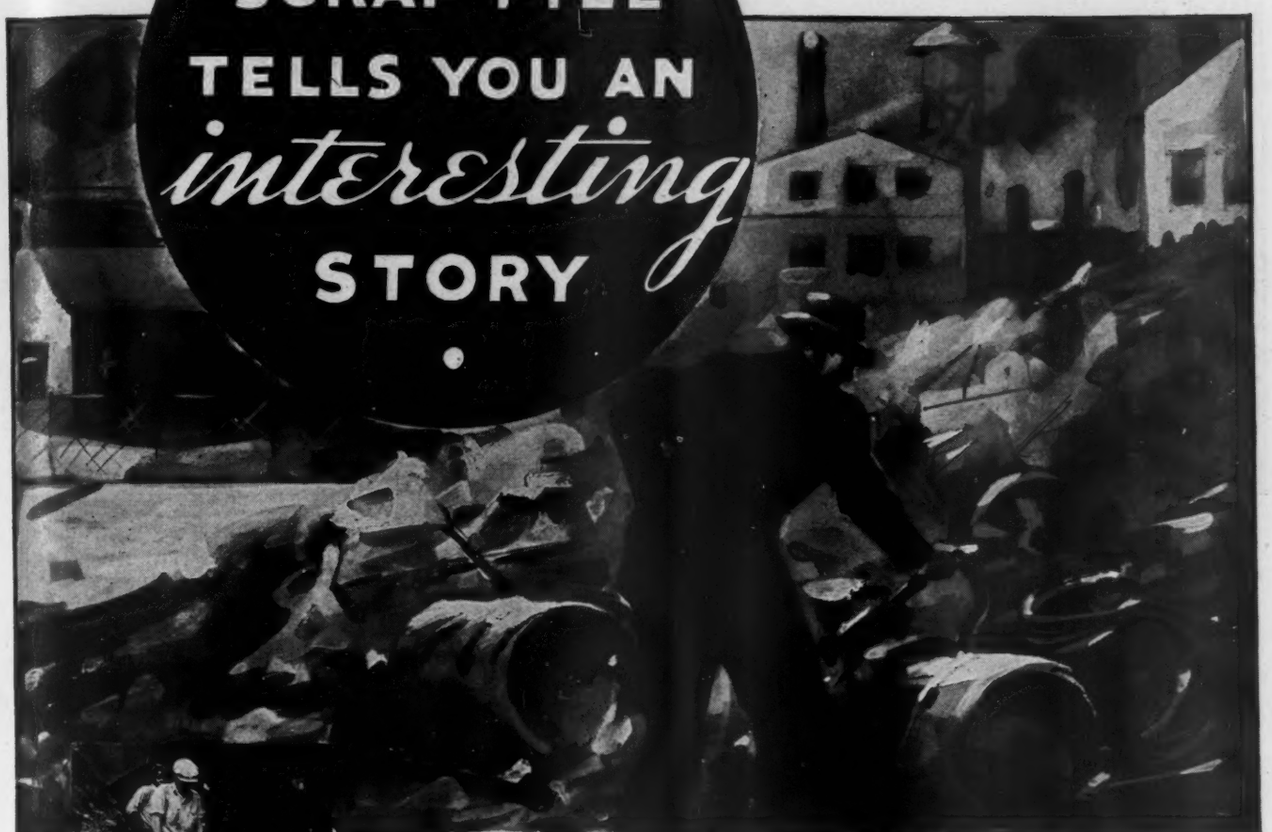
TELSMITH

YOUR SCRAP PILE TELLS YOU AN *interesting* STORY



There is a "U. S." Hose for every need: Acetylene, Acid, Air, Chemical, Coke, Dredging, Drill, Fire, Gasoline, Grease Gun, Grease Pump, Hydraulic, Mill, Oil, Oxygen, Paint Spray, Pile Driver, Pneumatic Tool, Sand Blast, Spray, Steam, Suction, Tender, Tubing, Washout, Water, Welding, etc., etc.

Also a complete line of Belting; Packings; Tank Linings; Moulded Goods; Electric Wire, Cable, Tape.

FEW HOSE USERS keep records of hose performance and the scrap piles of industry point an unheeded finger at wastes caused by hose. And yet those same scrap piles are writing an indelible story about hose performance. Many of them give living proof of the superiority of "U. S." hose .... one of the reasons why the U. S. Rubber Company sells more hose than any other manufacturer.

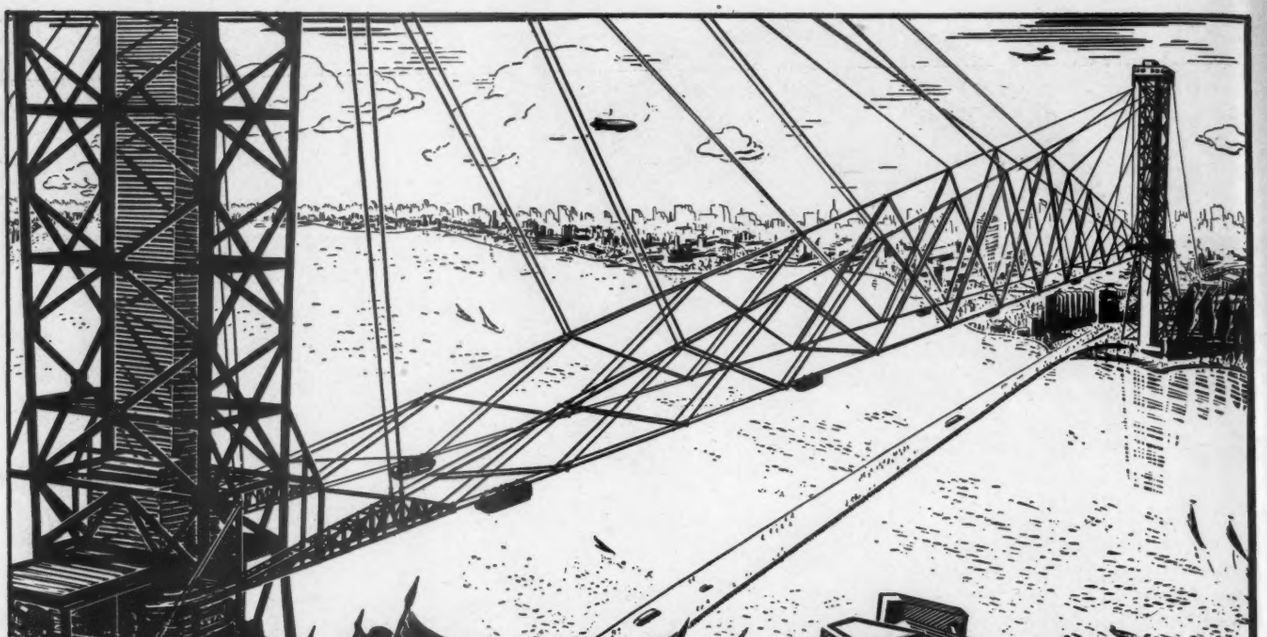
Such outstanding leaders in the "U. S." line as "U. S. 48-10," "Matchless," "Rainbow" and others have long enjoyed the confidence of industrial hose buyers as a result of their unusually low performance cost.

Make a study of your scrap pile. It may tell you where many losses occur, how they occur and why. Then call in a "U. S." representative, tell him to prove to you the greater economy of his product. A letter or phone call will bring a representative without obligation.

United States Rubber Company

1790 BROADWAY, NEW YORK CITY

STOCKS IN ALL INDUSTRIAL CENTERS



The spectacular Sky Ride, Century of Progress, Chicago, made possible through the development by Roebling of a new engineering principle in cable suspension.

1½ MILLION PEOPLE
CARRIED SURELY AND SAFELY

...on the Sky Ride, spectacular Century of Progress feature—suspension system designed and installed by ROEBLING...

One of 10 Sky Ride rocket cars designed by Roebling in collaboration with the Goodyear-Zeppelin Corp.

Did you go to Chicago's Century of Progress? If so, you saw...and probably rode on...the Sky Ride...the modern World's Fair spectacular feature and successor to the once-conspicuous Ferris Wheel.

1½ million people in five months of 1933 were carried surely and safely on the Roebling Cable Suspension System...on cars which traveled a total of 50 to 60 thousand miles.

Towers are 628 feet high ... over ⅓ of a mile apart... and their Otis Elevators are equipped with Roebling Wire Rope. Span, between towers, is second longest in world. 10 Roebling "rocket" cars—each of 36 passenger capacity—travel 200 feet above ground on Roebling "Sky Ride Track Cable."

One of the 628 foot Sky Ride towers, each having four Otis Elevators equipped with Roebling Wire Rope.

Roebling was selected to design and install the Suspension System of the Sky Ride because of its vast experience and the unquestioned dependability of its bridge cables and wire rope. It designed this system in collaboration with Robinson and Steinman, well-known bridge engineers.

For over 90 years Roebling has been the pacemaker in wire rope and bridge cable development. These Roebling Products assure the highest obtainable degree of safe, economical service.

WIRE ROPE FOR ALL NEEDS... LARGE OR SMALL: No matter how exacting the service, or how large or small the order may be, Roebling can meet your requirements. And your order will receive the same careful, prompt attention, whether for a carload of rope or merely a few feet. John A. Roebling's Sons Company, Trenton, New Jersey.

ROEBLING
The Pacemaker in Wire Rope Development

Rock Products
With which is Incorporated CEMENT and ENGINEERING NEWS Founded 1896

Volume XXXVII | Chicago, July, 1934 | Number 7

Recovery Progress—Trends

THE main events during the past month center around the remarkable grist of new laws passed by the 73rd congress in the last few days of its life. Some of greatest importance to rock products producers are the Hayden-Cartwright act providing for a three-year highway building program; the housing act, introduced and passed through the personal efforts of the President; an act authorizing the RFC to make loans direct to industries; the municipal and corporation bankruptcy acts, which will permit hard-pressed municipalities and private corporations to revise their debt structures at the expense of their creditors; an act permitting the President to make reciprocal tariff agreements. Other new legislation is of vital, but not so immediate, importance. On the whole, the congress seems to have done about all that was expected of it to provide for recovery of the capital goods industries through government spending for public works and extension of credit for private construction. It remains to be seen if private industry and individuals make full use of the money and credit provided.

Public Works

The President has given practical assurance to PWA Administrator Ickes that $500,000,000 more will be allotted PWA from the money voted under the deficiency appropriation bill. In addition PWA will probably receive $250,000,000 of RFC funds under the terms of the same act. Of the original $3,300,000,000 provided for PWA under the recovery act of 1933 only $1,165,453,000 had actually been spent up to the time congress adjourned. Much of that spent went for such purposes as the CCC, farm credit, to various federal departments, etc. There remains $2,134,547,000 yet to be spent. Administrator Ickes recently announced that 563 non-federal allotments totaling $158,558,517 will be rescinded unless the recipients take immediate steps to get these projects under construction.

Highway Construction

All uneasiness in regard to the immediate future of the highway construction program has been removed by the passage of the Hayden-Cartwright act, which provides for a 3-year program, beginning July 1, 1934. For the first year, July 1, 1934, to June 30, 1935, $200,000,000 is provided as an outright grant to the states to be apportioned immediately under the provisions of the NIRA, or on the same basis as the $400,000,000 originally appropriated for highways in the NIRA. In addition there is $24,000,000 for forest, parks, Indian reservation and other public land roads, and $10,000,000 for emergency repairs and reconstruction of federal aid roads damaged by floods, earthquakes, hurricanes, etc.

After the expiration of the current fiscal year, ending June 30, 1935, the act provides for the restoration of federal aid under the terms of the Federal Aid act of 1921, which requires the states to match the federal money dollar for dollar; the amount of federal aid is fixed at $125,000,000 annually for two years, with $24,000,000 additional for roads in forests, Indian reservations, etc. Actually, congress did not appropriate the money for the fiscal years 1935-36, and 1936-37, because it has no power under the constitution to do so; it remains for the next congress to include provision for fulfillment of the act in its appropriation bills, as the 73rd congress did for the first year's requirement in the deficiency appropriation bill.

The Hayden-Cartwright act is notable in that it establishes a policy of refusing a full share of federal aid, after July 1, 1935, to any state which diverts to other purposes whatever portions of its gasoline taxes and motor vehicle license fees are now authorized by law for highway purposes. However, no state is to be thus deprived of more than one-third of the amount it would otherwise be entitled to. While this provision may not entirely prevent further diversion of state highway funds it will go a long way to make the practice unpopular.

Estimates of the amount of funds available for highway construction between now and July 1, 1937, vary from $1,000,000,000 to $3,000,000,000. At least $1,000,000,000 is apparently assured, including $230,000,000 of the $400,000,000 appropriated in 1933, most of it under contract, but still not spent.

Housing

The Administration's housing act is analyzed in the "Cement Products" section of this issue. Briefly, it provides protection of private credit for construction and repairs that may total several billion dollars. As a result of provisions for the rediscount of real estate mortgages and the assurance of their payment through a federal mutual insurance corporation, financing of home improvements will now be made possible in every community. Building material manufacturers and dealers, coöperating with the National Emergency Council at Washington, will set up a program which it is believed will create an enormous volume of business. The advantage of this measure is that it will apparently permanently cure conditions in the small building

Cement made by a new process—less costly than portland cement —was used to build this concrete dam in Mexico

field which have cost home builders exorbitant financing costs. If it works as intended it will be a self-sustaining proposition. It has been estimated that the new act will put at least 500,000 men in the building industry back to work by the first of the year. This figure is not high when it is understood that 4,000,000 were employed in the building industry before 1929 and approximately 12,000,000 human beings in the country were dependent on building as a livelihood.

Loans to Industry

The RFC is now provided with $300,000,000 for making loans direct to business enterprises, in amounts not to exceed $500,000. The Federal Reserve System is provided with $280,000,000 for the same purpose. The FRS has not announced just how it will operate but the RFC has, and these are some of its requirements: The security for loans may consist of any one or more of the following: A first mortgage on real estate, plant and equipment, or chattels; an assignment of current accounts or notes receivable; trade acceptances; warehouse receipts on merchandise stored in bonded warehouses, and first lien on other assets of sound value acceptable to the corporation. The corporation will not usually consider as satisfactory primary security, second mortgages, franchises, patents, goodwill or foreign securities.

Compliance with NRA codes is one requirement which must be adhered to by any prospective borrower.

Loans the RFC will not make are: (1) to finance consumer purchases, installment sales, or similar contracts; (2) finance imports and exports; (3) lend for development or promotional purposes, or to enable business concerns to expand into new fields of endeavor, or to concerns which have no reasonable assurance of success, or for which there appears to be no economic need; (4) lend to provide for the operation of any business in receivership; however, applicants will be considered for loans contingent upon the termination of the receivership by a settlement with creditors or otherwise so that the business will be restored to a solvent condition; (5) lend to concerns which are not in operation, especially if they have been inactive for a substantial period; (6) the applicant also must have been in business prior to January 1, 1934.

The RFC will lend in coöperation with banks, taking part of a loan, where the local bank is not capable of financing the whole proposition.

The RFC will have the right to examine the books and records of the company when it deems necessary, and can pass upon the salaries or dividends paid by the company as long as the loan is in force.

Cost of Recovery

There is a good deal of newspaper and journalistic attempt to scare the public over the cost of the recovery measures taken by the federal and local governments. For example, it is pointed out that combined indebtedness of federal, state and local governments is approaching 47 billion dollars, and that 40% of the nation's income is now going to pay taxes. It should be remembered that at least some of these billions are being used where private funds would normally be employed, and the public would be taxed in one way or another to carry a load of private debt, as well as it is to carry public debt. The surest way to prevent government spending is to substitute private capital for activities that formerly were financed exclusively by private capital. So long as those with capital prefer to lend it to the United States to finance such projects, rather than finance them directly, we shall be taxed directly by the government to pay the interest, instead of paying the interest through an expansion of private business.

Price Policy Mix-Up

On June 7, NRA announced a pricing policy for code industries which was hailed by unfriendly newspapers with such headlines as "NRA Abandons Price Control." On June 9, NRA followed its original announcement with an explanation that the policy outlined would apply only to codes not yet approved, and that existing code provisions on pricing would not be changed without the permission of the industries. In the intervening two days NRA was deluged with telegrams and letters of protest, and since then has been busy, and has kept the various code authorities busy, explaining it didn't mean what it said on June 7. The general consensus of opinion among newspaper editors is that NRA did mean it, but was obliged to make a change of front by the storm of protest. Revision of existing codes to make them conform to the announced policy is expected. The policy announced, briefly is as follows: To restore more competition, alleged to have been too much restrained by some codes, in new agreements that will be negotiated, the government plans to require that where price posting is permitted, the prices must be filed with a confidential agency which will make those prices known to other members of the industry or to consumers, only when they pay for the service; there is to be no extended period between the time a price is posted and the time it takes effect; no price can be raised within 48 hours after it is posted; setting of minimum prices would be left to NRA to be used in case of emergency only.

However, until such changes are incorporated in existing codes, all of the present code provisions on pricing are in full effect and can be enforced in the courts, at least theoretically. One code authority—that of the carbon dioxide industry—has already submitted revisions to its code in line with the new NRA policy. This industry is a division of the chemical manufacturing group and is already operating under a supplemental code approved May 4. The code authority would modify its agreement to provide open price filing with the chairman of the authority, who is a non-member of the industry. Prices would be distributed to members of the industry and customers willing to pay for the service. The amendments would bar agreements to fix or maintain price terms and would ban "destructive" price cutting. The amended code would also provide for complaint against prices to the code authority, which, if not adjusted, would be forwarded to the NRA planning division for settlement.

A Peek at the Future

One of the epigrams on the walls of the Ford Motor Co. building at the Century of Progress—Chicago World's Fair—is: "The recovery we need is of our own spirit of independence." In a widely quoted interview Henry Ford said, evidently in elaboration of that idea: "For the individual there is only one thing to do; to find something useful that has to be done, and then dig in and do it." If President Roosevelt's plans are carried out Americans will soon be incapable of such self help, because in his June 8 message to congress he said: "Three great objectives—the security of the home, the security of livelihood, and the security of social insurance—are, it seems to me, a minimum of the promise that we can offer to the American people. They constitute a right which belongs to every individual and every family willing to work. They are the essential fulfillment of measures already taken toward relief, recovery, and reconstruction." No one objects to the objectives, but the spirit of American independence is born of seeking them as individuals as well as collectively. If an attempt is made for a government guarantee of their fulfillment, Henry Ford may be right. It is probably with some such thought in mind that now and then a man of brains and experience rises to point out that there never was a time when business initiative commanded a greater premium than today.

Eighteen States Now Have Recovery Laws

To supplement the NIRA and aid in its enforcement by local authorities and state courts, 18 of the 48 states have now adopted recovery laws. These are California, Colorado, Illinois, Kansas, Massachusetts, Mississippi, New Jersey, New Mexico, New York, Ohio, South Carolina, Texas, Utah, Virginia, Washington, Wisconsin, West Virginia, Wyoming.

Loss of Blue Eagle Closes Hosiery Mill

That a business cannot violate NIRA and its industry's code with impunity, even if it escapes court action, is illustrated by the case of the Harriman Hosiery Mills, Harriman, Tenn., which had its Blue Eagle removed for alleged violation of the labor provisions of the law. The plant was closed June 25; officials of the company claiming the NRA was attempting to wreck it. The controversy grew out of a demand on the

part of NRA that the company fire strike breakers and reëmploy its former work people.

Labor Troubles Postponed

The proposed strike of the steel industry's employes was postponed, according to press reports, through the influence of William Green, president of the American Federation of Labor. It is generally believed that the demonstrations at Washington, D. C., and elsewhere by delegates of the Amalgamated Association of Iron, Steel and Tin Workers, were largely for the purpose of influencing congress to pass the Wagner bill. It is also believed that the A. F. of L. union actually comprised a small percentage of the workers and that they could not have conducted a successful strike.

Instead of passing the Wagner bill congress authorized the President to create boards to investigate issues, facts, practices, and activities of employers or employes in controversies arising under Section 7-a of the National Industrial Recovery Act or which are obstructing free flow of interstate commerce. These boards are to conduct elections by secret ballot, enabling employes to choose representatives for collective bargaining. These boards, with the President's approval, may prescribe regulations to assure freedom from coercion in such elections. The life of the boards is limited to June 16, 1935, but if conditions warrant the President or congress may end them prior to that date.

Meanwhile, the American Federation of Labor has joined the anvil chorus against NRA, with the following comment from its monthly survey of business: "In the last month business confidence has collapsed and many firms are reducing their activities to the barest minimum." Reasons ascribed by the A. F. of L. were: Postponement by business men of every expense because of no sure promise of profit under regulation by codes; regulation of the stock market by new legislation, regulation of banks for deposit insurance have enhanced prevailing uncertainties. "NRA has failed in the field of research and planning and has not coordinated business activity to achieve full rounded economic recovery," the survey observes. What the A. F. of L. did not mention is that the pending Wagner labor disputes bill was the most important factor in undermining the confidence of business men.

Federal Trade Commission Goes After Builders' Supply Dealers

Building material dealers in the Pittsburgh-Cleveland area are charged with forming a combination to compel distribution of building material in the Pittsburgh-Cleveland trading area through "recognized" dealers affiliated with the Building Material Dealers' Alliance. That Alliance and its organizers, four Pittsburgh and Cleveland organizations of dealers in building supplies, are named as respondents in a formal complaint issued by the Federal Trade Commission. A hearing on the complaints will be held in Washington, D. C., July 13. The dealers, among other things, are charged with attempting to compel building material producers and manufacturers to distribute through their hand-picked dealers only; also, to prevent other dealers, contractors and purchasers from participating with respondent organizations and "recognized" dealers in pool car shipments of such materials; to require manufacturers and producers of building materials to "confine and limit their distribution thereof to carload quantities and to shipments by railroad only," and thus compel such manufacturers and producers "to refrain from and to refuse to permit such distribution of their materials and supplies to be made by motor truck or motor vehicle" and thus eliminate the use of motor vehicles for such transportation as well as eliminate the actual or potential competition to respondent members and "recognized" dealers furnished by contractors, dealers, consumers or others.

To prevent manufacturers of cement blocks and building materials of similar types from purchasing supplies direct from manufacturers and producers, and to require them to purchase their raw materials and other supplies exclusively from respondent members and "recognized" dealers at "prices which include or afford such dealers and members an allowance, commission or profit upon such purchases." To require and compel the sale and distribution of all cement requirements for all buildings and other private construction, as well as for highway, bridge and culvert construction and maintenance, and the cement requirements for cities, counties and all other political subdivisions to be made through the medium of the respondents and "recognized" dealers and at prices or conditions of sale which include or afford such members and "recognized" dealers an allowance, commission or profit, and to induce or compel manufacturers and producers of cement to cease and desist from making any sales of such cement direct to contractors, States, counties, political subdivisions thereof, or to non-recognized dealers or purchasers, and "to cease and desist from making sales in any way which does not afford such 'recognized' dealers or respondent members a commission, allowance or profit on the purchase of such cement."

TVA Projects Challenged

Alabama coal mining interests have challenged the right of the Tennessee Valley Authority to wreck their industry by engaging in the electric power industry and selling electric-heating appliances, by a suit in the federal court at Birmingham, Ala., charging a violation of the constitution of the United States. They also ask that the TVA be enjoined from expending public funds in the construction of hydroelectric plants having a capacity in excess of certain primary requirements corollary to flood control and navigation and to bona fide expenditures for nitrates or other war materials.

The plan and program of TVA to acquire and operate utility systems, it is alleged, is beyond the power of congress to authorize and in derogation of rights reserved to the states and the people thereof and is not authorized by the Tennessee Valley Authority act; but no matter what the interpretation of the statute, the acquisition and operation of distribution systems in the field of general domestic and industrial distribution throughout the State of Alabama are not a proper federal function and are not within the power of congress or any agency thereof.

Georgia District Court Upholds NIRA

Provisions of the National Hosiery Code prohibiting the operation of knitting machines more than two shifts a day, and the NIRA in so far as it constitutes authority for the adoption of a code containing such provisions, are not unconstitutional as to a manufacturer which alleged in its action to enjoin the enforcement of the code that the limitation on operations would necessitate the discharge of about 20 operators, which would in turn displace approximately 150 other employes engaged in subsequent operations, and would cause the manufacturer to suffer a great loss, according to a decision of the federal court of the northern district of Georgia.

The NIRA, in so far as it provides for the adoption of codes, is not unconstitutional on the ground that it constitutes an attempt by congress to delegate its legislative power to the President and certain unofficial groups. Congress has fixed a primary standard and has merely empowered the President to fill up the details by prescribing administrative rules. One of the express purposes of the act is "to eliminate unfair competitive practices." It is not shown that the means selected are not reasonably adapted to serve that purpose. The codes become effective, not by virtue of acts of such unofficial groups, but by the act of the President in approving the code based on findings which he, himself, has made, according to the court's decision.

Workmen's Compensation for County Relief Laborers

A decision by the Illinois Supreme Court, if accepted as a precedent in other states, will do much to limit the competition of counties, towns and other local authorities in the production of highway and other construction materials. The court decided that a park district whose workers are paid from relief funds is liable under the workmen's compensation act in event of injury or death. The ruling was given in affirming decision of the Cook County circuit court which had approved an award of $1,274 to August Potkonen against the Forest Preserve district of Cook county while he was employed in relief work in the area. The decision has already had the effect of dampening the enthusiasm of some Du Page county towns contemplating putting relief workers in temporary gravel pits, because the towns would have to put up about 10% of the payroll for employers' liability insurance.

Special Cements Gaining Wide Recognition in Mexico

THE special cements made by the new process developed and patented by Alton J. Blank, chemical director, Cement Process Corp., Mexico City, Mexico, and general superintendent, Cia de Cemento Portland "Landa," S. A., Puebla, Mex., are gaining wide recognition in Mexico, famous for the fine work of its masons and plasterers. The accompanying views are sufficient evidence of this.

The process of making these cements was described in Rock Products, August, 1933. Their base is lime, and they are less costly to manufacture than portland cement, and their special properties permit them to be sold in competition with portland cement. The Landa company has already established two brand names—"Atoyac," which enters into direct competition with its portland cement, and portland cement-lime mortar cements—and "Plastocement" which is used for stucco and plaster. Both are made by the same process with minor variations in proportioning the materials and control exercised during the manufacturing operation.

The Atoyac cement, according to Mr. Blank, is superior to portland cement in one-year strength tests, denoting a continued growth in strength and apparent durability; it has less than 60% of the "heat of hydration" developed in portland cement; apparently it is more resistant to sea water and other corrosive waters. Mr. Blank also claims for it plasticity and low specific gravity, which gives it volume and sand-carrying capacity. The Plastocement is especially designed for both exterior and interior stucco and plaster. It has also been used quite successfully, according to Mr. Blank, for concrete masonry units.

The Cement Process Corp. is incorporated in Delaware. The stockholders are the same as those of the Landa Company, with Mr. Blank, and it owns the patents for the process. The patent for the original process (U. S. No. 1,912,883) has been supplemented by another No. 1,953,924, issued April 10, 1934, which covers the use of certain accelerating agents, or catalysts, which include ordinary salt (sodium chloride), calcium chloride, sodium hydroxide and tannic acid. One or more of these are added to the water with which the lime is hydrated, increasing the early strengths of the cements made by the process, which consists of hydrating, and mixing simultaneously in a pug mill, quick lime and some argillaceous material, such as diatomaceous earth, silica, clay, etc., and then grinding the product in a tube mill, with or without the addition of some portland cement clinker.

Incidentally, the name of the Landa company has just been changed to Cementos Atoyac, S. A. F. J. Miller is president and general manager.

The process is more specifically described in the recent patent as follows:

"While the presence of a small amount of free water appears to be essential to insure that the desired reactions between the lime and the siliceous and aluminous components of the mixture are brought about in the tube mill grinding operation the amount of water present in this stage should be kept low and always should be insufficient to produce wet grinding conditions. Therefore, the amount of free water present will never exceed about 50%, even with highly absorptive materials, such as diatomaceous earth, and with less absorptive materials may not exceed 30%. Except when the hydration of caustic lime is to be carried out in the tube mill simultaneously with the mixing and grinding thereof with the argillaceous materials of the mix, the percentage of water present will generally be far below the maximum permissible to maintain dry grinding conditions. However, a considerable range of choice is permitted within the limits of the range above indicated, since the water originally present or added in the grinding stage is always largely removed in the course of the grinding operation under the influence of the temperature maintained. At the same time, because of the fact that the amount of water added in the course of the process may be varied over a considerable range, it is possible to vary the quantity of water used so as to insure the introduction of the desired amount of accelerating agent in the form of a solution or dispersion even when dealing with agents of this class that have a relatively low solubility. However, when dealing with the agents above named, no difficulty is met with on this score. With the exception of tannic acid, all are very soluble. Although less soluble, tannic acid dissolves with sufficient ease in water so that sufficient of it is carried in a small proportion of water to produce the desired results."

Foreign Expert Predicts New Cements From Lime

R. Zollinger, a German specialist in the chemistry of portland cement, writing in *Cement and Cement Manufacture* (Great Britain) on "Practical Developments to Be Anticipated in the Cement Industry," November, 1933, concludes: "Future work must attempt to produce $2CaO.SiO_2$ in the cement by combination of the free CaO and active SiO_2 with the objects of improving resistance to acids and accelerating the attainment of ultimate strength. Success in this direction—towards which trass cement is perhaps the first step—would be of great interest to the cement industry and would bring lime to a position of importance once more. It would possibly revolutionize the present conception of cement, replacing modern cements by a composition of lime containing the highest possible content of highly active silica. The ultimate strengths of such lime-silica mortars might even exceed that of the best present-day cements."

Recent Prices Bid and Contracts Awarded

Bellefontaine, Ohio: C. E. Duff awarded contract for furnishing all the stone for the repair of streets and other projects. His bid was $1.15 per ton delivered.

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Syracuse, N. Y.: Contract for supplying work relief projects in Onondaga county with 1,786 bbl. of cement was awarded to the Alpha Portland Cement Co., subject to approval of the state temporary emergency relief administration. The company was tied for low, at $2.39 a bbl., f. o. b. Jamesville, N. Y., with two other concerns, the Glens Falls Portland Cement Co. and the Lawrence Portland Cement Co. Paragon Plaster Co. and F. P. McCarthy, both Syracuse builders' supply dealers, submitted bids of $2.54.

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Newburgh, N. Y.: City Manager Joseph A. Fogarty awarded to A. E. Lucas, 155 South William street, the contract for supplying crushed stone to the city for the remainder of the year. A base price of $2.25 for the material, to be supplied as needed, was fixed.

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Dayton, Ohio: City commission awarded contracts for washed sand and gravel in equal portions of 1,785 cu. yd. each at $1.50 per cu. yd., to the Moraine Sand and Gravel Co., the Keystone Sand and Gravel Co., and the Hurst Sand and Gravel Co. Eight identical bids were received for portland cement at $2.34 per bbl. The order was split among six of the eight dealers.

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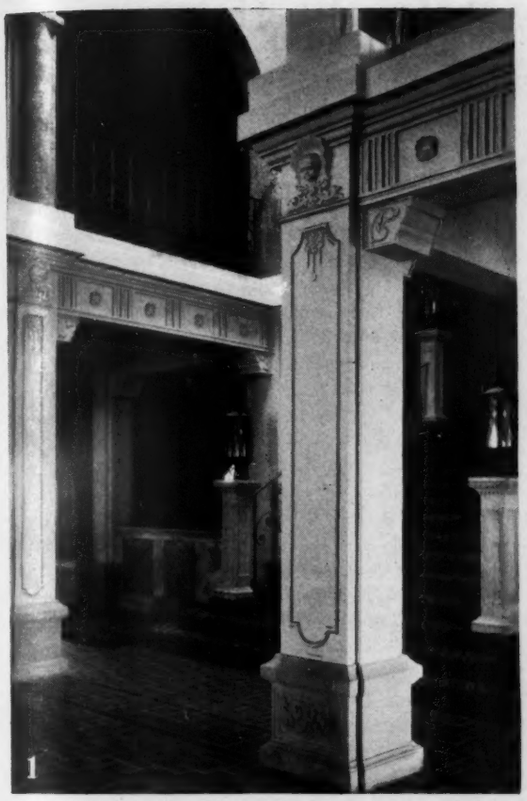
Cedar Rapids, Ia.: Robert I. Larimer, receiver for Larimer and Shaffer, Inc., local sand and stone firm, was authorized in district court Friday by Judge H. C. Ring to contract with Bemus and Schlick, contractors, for the city's new sewage disposal plant, to provide between 1,000 and 2,000 tons of stone chips. The stone chips, ranging from ¼ to ⅝-in., will be used in the sewage plant construction. The contract price will be $1.35 per ton.



Illustrations 1 and 2—Interiors of Hotel Garci-Crespo, Tehuacan, Puebla, Mexico. Plastocement was used for inside plastering and for bricklaying as well as for outside stuccoing (see No. 3—hotel exterior). Illustration 4—Mosaic mural effected with Plastocement in the hotel, of which President Rodriguez of Mexico is one of the principal stockholders. Atoyac cement was used in all concrete construction. Illustration 5—A Mexican municipal waterworks in which the new cements, Atoyac and Plastocement, were used

Iowa Plant Modernization Makes Possible Accurate Sand Grading

Muscatine Operator Is Now Enabled to Meet the New Specifications Developed by U. S. Engineers

CHANGING specifications calling for accurate proportions of graded materials for aggregates used on various government projects are forcing operators to revamp their classifying, screening, handling and blending systems. The most conspicuous examples are sand specifications which call for separating and recombing sand of at least three different sizes or gradings. New requirements of the U. S. Army Engineering Department for Mississippi River dam and lock construction, which the Northern Gravel Co., Muscatine, Iowa, recently contracted to furnish, call for a sand meeting the following specifications:

THROUGH SIEVE	PERCENTAGE
⅜-in.	100%
No. 4	95 to 100%
No. 16	35 to 75%
No. 50	10 to 25%
No. 100	0 to 7%

To meet this specification a new installation of classifiers with some rearrangement of bin facilities, conveyors, etc., now is complete. It permits separation of the sand into three distinct gradations and combinations of these. Almost any combination of sand grades that reasonably may be expected thus can be produced economically and with dispatch.

Compared with the gradations noted before, the following table shows actual results produced since the new installation was made:

THROUGH SIEVE	RETAINED
⅜-in	0
No. 4	4%
No. 16	43%
No. 50	38%
No. 100	14%
No. 200	1%

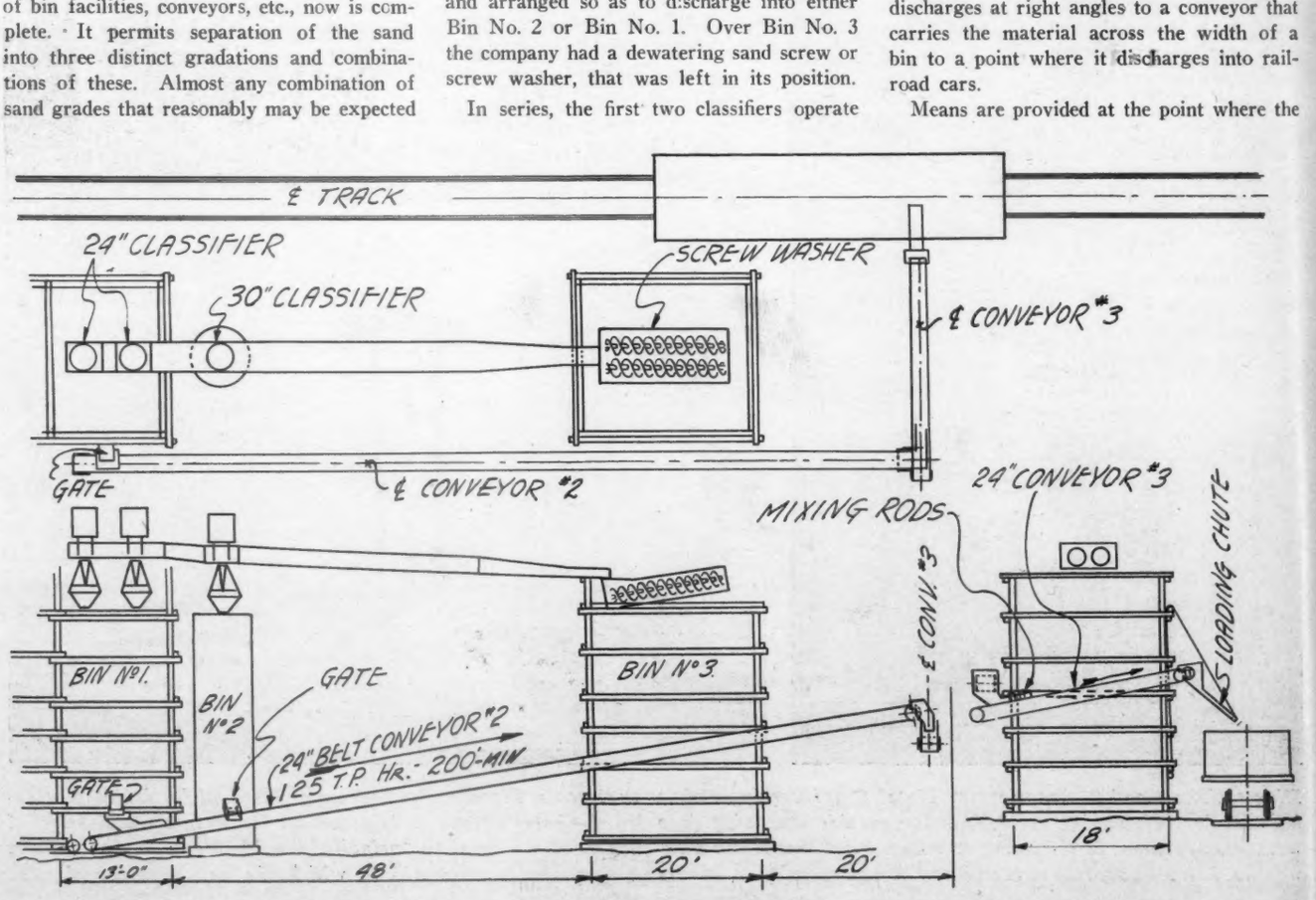
Bins were in place, as shown in the diagram, except for the fine sand tank. A steel tank was made to serve for this unit (Bin No. 3). Originally the company had Dull conical sand screens over Bin No. 1, which were put in when the plant was installed about 1914 or 1915. These old separators now are replaced with two 24-in. Shaw classifiers placed in series directly over Bin No. 1. Directly over Bin No. 2 is a 30-in. Shaw classifier in series with the first two, and arranged so as to discharge into either Bin No. 2 or Bin No. 1. Over Bin No. 3 the company had a dewatering sand screw or screw washer, that was left in its position.

In series, the first two classifiers operate as if they are one unit, and make a very coarse sand composed largely of sand grains between 4-mesh and 20- or 28-mesh. The 30-in. classifier, when discharging into Bin No. 2, produces a sand largely from 28- to 48-mesh.

Overflow from the last classifier then goes to the dewatering sand screw where the product which remains is caught. This consists mainly of a product from 50- to 100-mesh. (The separations, as mentioned, do not represent exact splits, of course, at either 28- or 48-mesh, but the major portion of the grains are between those sizes.) Material then can be drawn from either bin in any proportion desired and put on the first belt conveyor.

Thus the operator may draw a quantity of coarse sand from the first bin, mix it with the required amount of intermediate sand from the second bin, and fill in the proper quantity of fines from the third bin. All of these go on to the same belt which, in turn, discharges at right angles to a conveyor that carries the material across the width of a bin to a point where it discharges into railroad cars.

Means are provided at the point where the



General diagram of modernization project completed for Northern Gravel Co., Muscatine, Iowa. Conveyor shown in side elevation leading upward and to right, discharges at right angles to another conveyor which mixes and delivers sand to cars

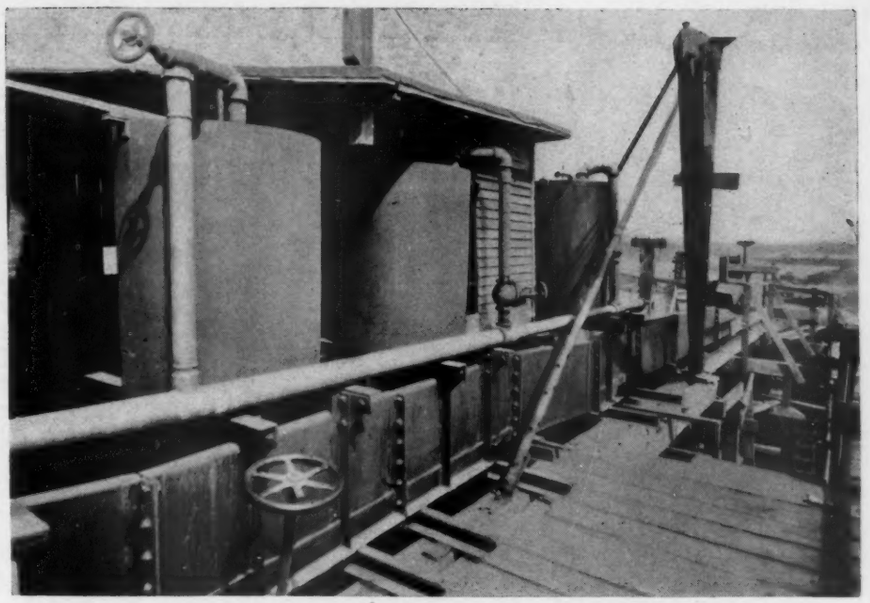
material is transferred to the second conveyor, to turn over the sand on the belt. By the time the blend reaches the car, the different sizes are thoroughly mixed.

Since the new installation was made this season, the company reports that the material coming from the machines is "clean, well graded, and makes a very satisfactory product."

The two 24-in. belt conveyors operate on Link-Belt Timken roller bearings, troughing and return idlers. The drive is through a Link-Belt worm gear reducer with roller chain drive from the slow speed shaft of the reducer to the head shaft of the first conveyor.

C. S. Huntington, engineer of the Link-Belt Co., Sand and Gravel Division, developed the plan for this modernization project at the request of E. W. Boynton, Jr., president of the Northern Gravel Co. J. W. Cockerill is superintendent of the company.

When the company's charter was renewed this year, provision was made to expand its activities into the contracting field.



Closeup of the new sand classifiers installed by Northern Gravel Co.

Recent Prices Bid and Contracts Awarded

Syracuse, N. Y.: Onondaga county purchasing agent twice rejected bids on 786 tons of sand for relief highway improvement projects. Said the county purchasing agent after second rejection: "If these unfair prices continue to exist we will be forced either to go outside the county or to own and operate a county sand pit to take care of our sand requirements. When it becomes necessary for the county to pay $2.25 a ton for sand with 2.3 mile delivery to the Stump city road, $2.25 a ton with a 3.2 mile delivery to the Stump road extension, and $3 a ton with a 12.5 mile delivery to the Apulia-Shanahan road, and these being in line with most of the bids received for the second time covering county sand requirements, it is time that something drastic be done in the matter."

Schenectady, N. Y.: Re-advertising for bids for the purchase of 10,000 tons of gravel, the board of contract and supply received new bids which are $3,000 under those received two weeks earlier. Each of the four bidders submitted a unit price of 70c per ton or a total of $7,000.

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Tiffin, Ohio: Four companies submitted bids to the county commissioners for furnishing stone for use in county road work. The bids will be used as a basis for stone purchases during the year. No contracts will be awarded. The National Co., No. 7 stone at 75c a ton and all other sizes at 90c a ton f. o. b. trucks at Carey. Basic Dolomite, Inc., bid 75c for No. 7 and 90c for other sizes f. o. b trucks and 65c for No. 7 and 80 for other sizes f. o. b. railroad cars at Maple Grove.

The France Stone Co. bid 75c for No. 7 and 90c for all other sizes f. o. b. trucks at Bascom, Bloomville and Bellevue and $1.20 for 6-B special and $1.40 for 9-C special. The Higgins Stone Co., Bellevue, bid 75c for No. 7 and 90c for other sizes f. o. b. trucks and 70c for No. 7 and 80c for other sizes f. o. b. cars.

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Neenah, Wis.: The bid of Landwehr and Hackl, Seymour, of 60c per cu. yd. was the lowest of three on the furnishing of 1,750 cu. yd. of crushed gravel for the city. The Fountain Valley Stone Quarry, Fremont, submitted 99 and 90c per cu. yd. and Courtney and Plummer, Oshkosh, 75c. The bid of 60c is lowest submitted here in many years.

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Phillipsburg, N. J.: Contracts for county road maintenance were let for furnishing and placing broken stone screenings or washed pea gravel: Marksboro, 539 tons, Portland Sand & Gravel Co., $916.30; Marksboro, 539 tons, Hodgson Sand & Gravel Co., $916.30; Hope, 730 tons, H. L. Goble & Co., Inc., $1,058.50; Delaware, 1,120 tons, Portland Sand & Gravel Co., $1,680; Allamuchy, 50 tons, Hodgson Sand & Gravel Co., $70; Great Meadows, 700 tons, Warren Sand & Gravel Co., $868; Belvidere, 465 tons, Portland Sand & Gravel Co., $790.50; Harmony, 1,180 tons, Warren Sand & Gravel Co., $1,711; Warren Glen, 110 tons, Warren Sand & Gravel Co., $159.50; Stewartsville, 230 tons, Warren Sand & Gravel Co., $333.50; Pequest, 645 tons, H. L. Goble & Co., Inc., $838.50; Washington, 470 tons, Warren Sand & Gravel Co., $822.50; Asbury, 700 tons, Warren Sand & Gravel Co., $1,085.

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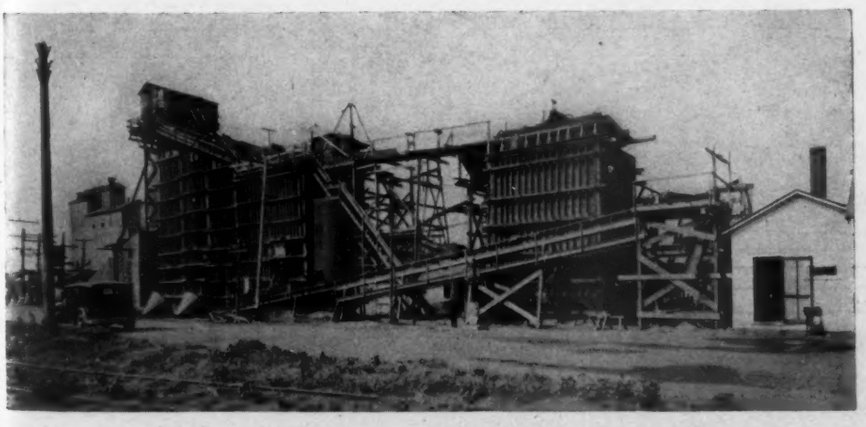

Plant of Northern Gravel Co., Muscatine, Iowa, showing partial view of new sand classifier and handling equipment installation. The company's drying plant is in background at left

Cement

Ash Grove Lime and Portland Cement Co., Chanute, Kan., is completing new concrete silos. Approximately 200 men were given temporary employment.

Use of Resistivity Methods for Locating and Exploring Deposits of Stone and Gravel

By Karl S. Kurtenacker

OF the four major methods of geophysical prospecting, namely gravitational, magnetic, seismic and electrical, only the latter, the electrical, can now be readily and practically utilized in quickly locating deposits of stone or gravel.

This sort of work deals entirely with relatively shallow depths, and consequently it is necessary to have at hand a method, the economic value of which lies in the possibility of obtaining certain salient information very rapidly.

Most of the information that is desirable to have on hand prior to operating a quarry or gravel pit can be obtained by trenching, test pitting, or by the use of some sort of core drilling outfit, but at their best, these methods are costly because of the time required to obtain the information.

The electrical, or resistivity method of geophysical prospecting best adapted to the problems discussed in this paper, employs the use of artificially created energy which is sent into the ground through the two outermost of four evenly spaced electrodes. The potential drop is measured between the two inside electrodes, which are used to lead the current back through the measuring instrument. The depth of investigation is controlled by the spacing of the electrodes. This method of spacing four electrodes equal distances apart in a straight line is known as the Wenner method of measuring earth resistivity.

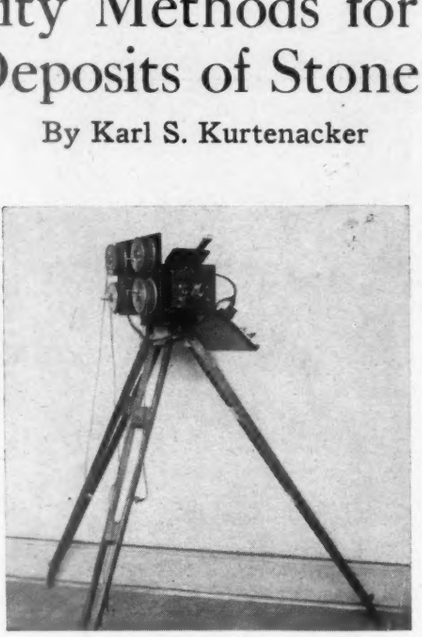

Fig. 1—Portable ground tester

Two types of instruments can be employed for this sort of work, either an instrument built along the principle of the original Gish-Rooney device, or a Megger ground tester. The Gish-Rooney apparatus embodies a potentiometer, a milliameter and a double commutator, the power being supplied by batteries. The Megger ground testers are manufactured in England and are distributed by the James G. Biddle Co., Philadelphia. The Meggers differ materially from the Gish-Rooney in that the potentiometer and milliameter are combined in one instrument, and

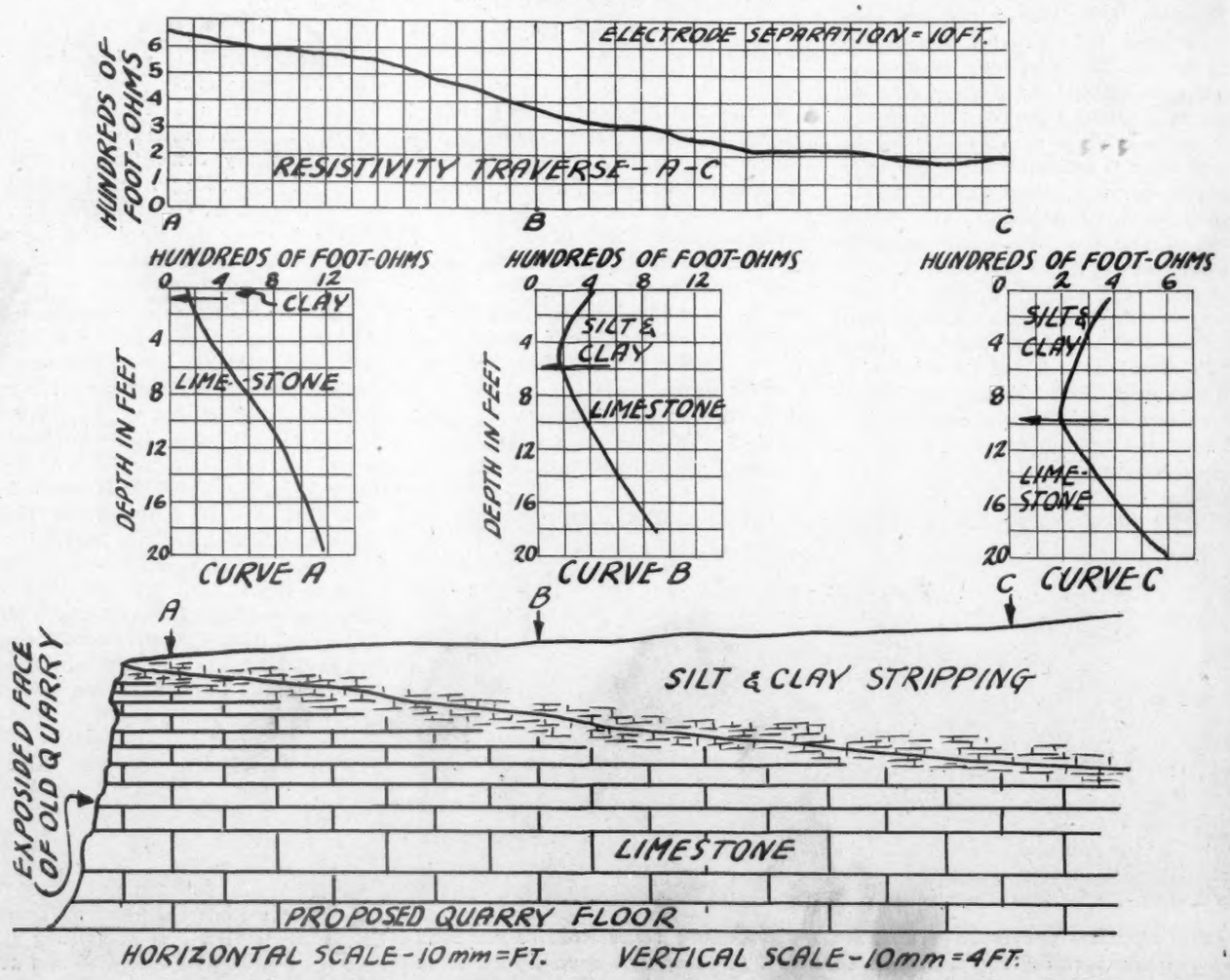

Fig. 2—Diagram of proposed quarry with resistivity depth profiles charted

power is supplied by a hand-driven d.-c. generator, on the shaft of which is a double commutator.

The Gish-Rooney apparatus is not commercially manufactured, most of the instruments being made in physical laboratories associated with colleges and scientific organizations.

The writer in his work uses a Megger ground tester solely because the instrument is extremely rugged and portable. For field work the Megger is mounted on a specially built reel and switch box which, in turn, is mounted on a tripod. Fig. 1 illustrates the author's equipment. The entire outfit is very fieldworthy and can be transported by two men in the roughest sort of country.

Kind of Surveys

Resistivity surveys can be divided into two groups: (1) depth soundings, and (2) step-traverses. Depth soundings are comparable to borings, and show the vertical variations of resistivities and reveal the depths at which geological changes occur.

These soundings are obtained by placing the electrodes to read to a depth of one foot, and progressively increasing the electrode separation foot by foot, taking the observed resistivity at each spacing, until the desired depth is reached.

The readings are plotted in the form of a graph, the abscissa representing resistivity in ohms per foot cube. The abscissa is expressed in "foot-ohms." The ordinate represents the depth in feet, which is empirically equal to *a*, the electrode separation, and is expressed in feet.

The graphs, if properly interpreted, show the thickness and character of the formations underlying the surface at the points of observation. Empirically, geological discontinuities in the sub-surface show themselves by corresponding discontinuities on the resistivity graph.

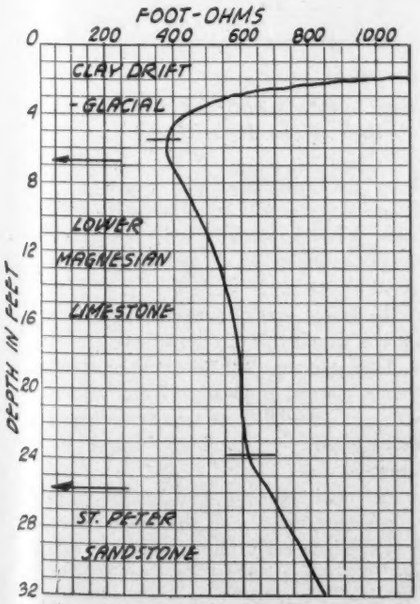

Fig. 4—Electrical depth soundings chart, revealing sandstone beneath quarry bed

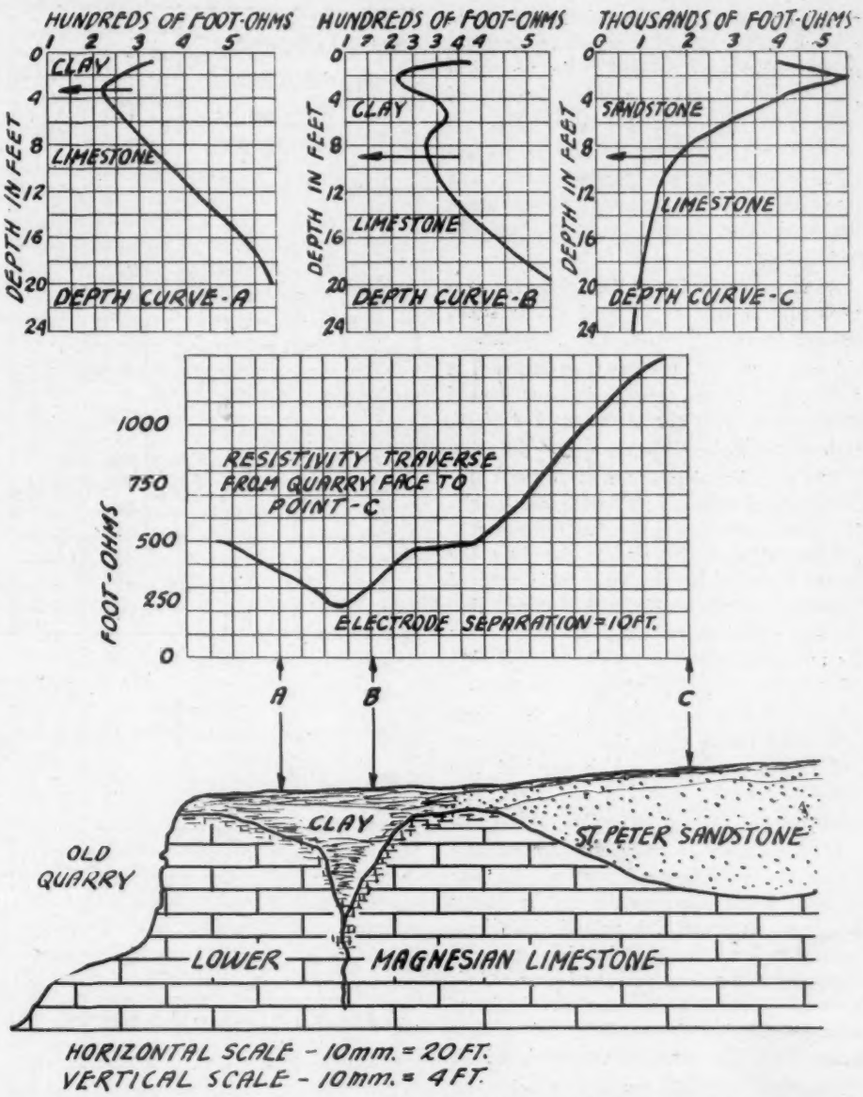

Fig. 3—Schematic diagram through limestone spur with resistivity depth profiles and step-traverse charted

Step-traverses, instead of denoting vertical variations of resistivities, show horizontal variations. Readings are obtained at intervals along the traverse with the electrodes set at a uniform spacing. Thus, if readings are taken every 20 ft. along an imaginary line *AB*, and the 20-ft. spacing between electrodes is maintained, the result is a profile of resistivities to a depth of 20 ft. along this imaginary line.

The step-traverse readings are plotted in graph form, the ordinate being expressed in foot-ohms and representing resistivity in ohms per foot cube. The abscissa represents the horizontal distance along the traverse and is expressed in the numbers, letters or symbols that identify the stations.

The method of obtaining and plotting the data has been briefly explained so as to fully understand the accompanying graphs and charts.

The last decade, an era of gigantic road building programs, brought forth a new outlet for crushed stone and gravel. States like Wisconsin that were thought to be blessed with a seemingly unlimited supply of glacial gravel have very largely used local deposits for highway construction and maintenance.

Recently, certain counties and vicinities have discovered that the local supply is not unlimited. In many areas gravel deposits are exhausted. This brings to even more importance the use of quarries as a source of large amounts of surfacing material and concrete aggregate.

Importance to Quarry Operators

Operators of both large and small quarries have in the past generally gone into the location pretty blindly, geologically speaking. The operating of a quarry, especially a small local one, designated to supply the immediate job at hand, may often be brought to a complete stop by any one of four factors:

(1) The stripping may become so thick, or as quarrymen say, "heavy," as to render im-

possible further operation of the quarry at a profit. This hazard is especially prevalent in areas that were covered in the geological past by glacial drift or thick deposits of wind-blown silts, commonly called loess.

For example, Fig. 2 is a schematic vertical cross-section through a proposed quarry. The material was to be obtained by working a limestone ridge, commencing at an abandoned quarry face.

As is shown in Fig. 2, the old quarry face exposed a 20-ft. face of good quality stone, covered by only ½ ft. of clay stripping.

Resistivity depth profiles were obtained at distances of 10, 80, and 170 ft. from the old quarry face or at the places marked *A*, *B*, and *C*, in Fig. 2.

The electrical depth profiles *B* and *C* revealed 6 and 10 ft. of stripping, respectively. In other words, when the quarrying operation would reach 150 ft. into the ridge, the operators would be moving a cubic yard of stripping for every cubic yard of stone. Fig. 2 better explains the situation. Notice how the resistivity step-traverse decreases in ohm value as the amount of stripping increases.

This difficulty was foretold by the simple process of taking three electrical soundings and one step-traverse, which required two hours field work. The data was plotted and the resistivity curves interpreted on location.

(2) Operators of quarries are constantly facing the possibility of running into any number of sink holes, especially if the quarry is located on some high upland ridge in a geological formation that has been exposed to erosion for a long period of time. Sink holes are so much a characteristic of a limestone upland that the possibility of encountering them in a quarry is very real, indeed.

Sometimes the sinks are narrow veins and other times they are large, embracing 50% or more of the quarry face. The sinks may be in the form of clay-filled pockets or void solution cavities. It is the clay pockets that are most troublesome to quarry operator, especially if the stone is being used as concrete aggregate. Fig. 3, curve *B* is a resistivity depth curve revealing a clay pocket.

(3) When operating a quarry in the top beds of a formation that lies unconformably below a different bed, there is always present the possibility of running out of the quarry horizon. The author, on a brief reconnaissance survey, spotted such a condition.

The schematic diagram in Fig. 3 represents a vertical cross-section through a limestone spur of which only the old quarry was exposed. To all outward appearances the excellent face of massive limestone, with almost no stripping, carried back through the spur. Because the top surface of the limestone in question here, the Lower Magnesian, was badly dissected before the St. Peter sandstone was deposited above, it was deemed wise to conduct some sort of investigation before quarrying was commenced.

It was necessary to take only three resistivity depth profiles and a step-traverse to see what sort of difficulties would be encountered in the quarry illustrated in Fig. 3. Depth profile *C*, 230 ft. back along the ridge from the quarry face, revealed 9 ft. of St. Peter sandstone resting above the Lower Magnesian. The same comparable 9 ft. at the quarry exposed good limestone. Depth profile *B*, taken between *C* and the quarry face, revealed a clay filled sink hole, 10 ft. in depth. Notice that the step-traverse rises sharply in ohm value over the sandstone.

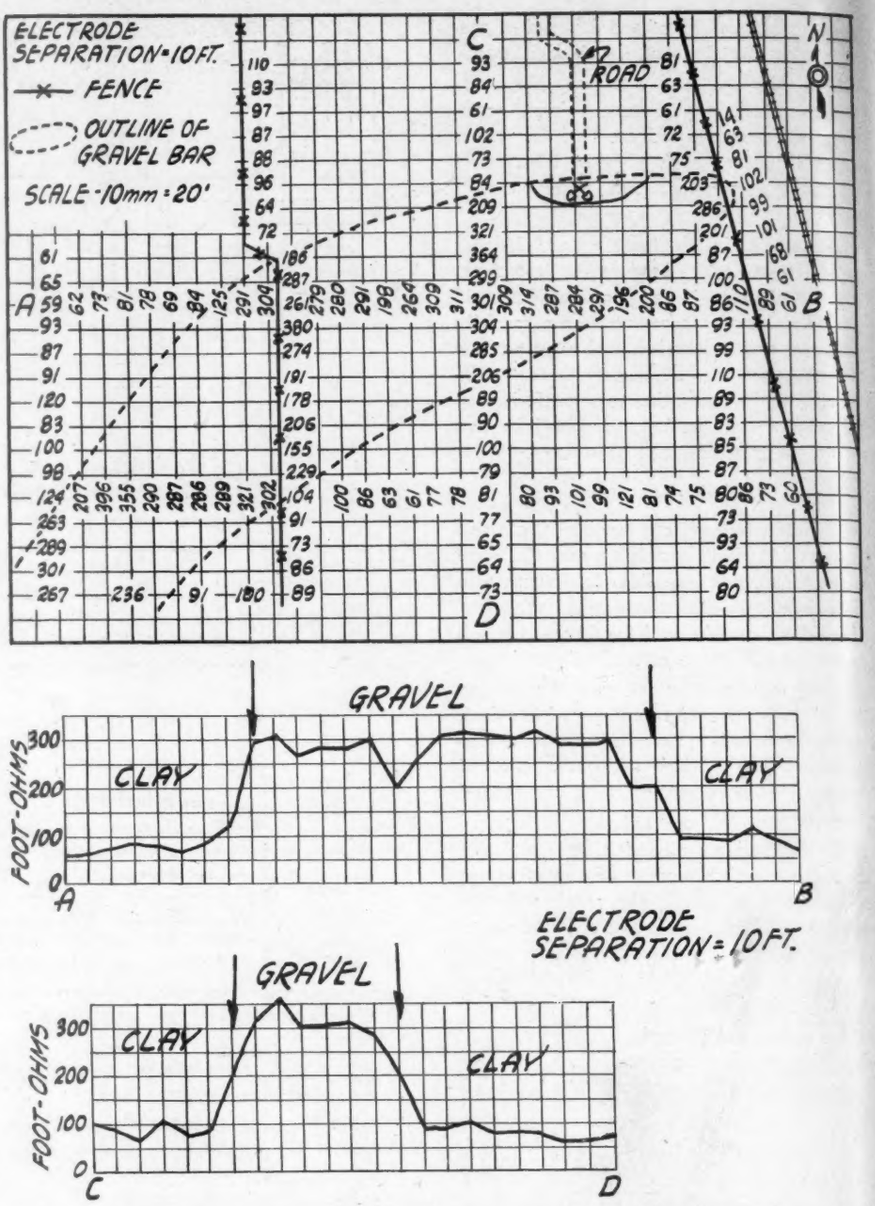

Fig. 5—Two resistivity step-traverses (below) across a buried gravel bar. Upper chart shows equi-resistivity map of the deposit

Simple reconnaissance such as this saves money. Had the conditions not been known, the contractor or operator would surely have had to abandon this location after the set up had been made and a few yards of stone removed.

(4) The quarry operator should be informed about a fourth factor. He should know the lower limits of his quarry. If he is quarrying in the lower portion of a limestone formation that is underlain by a sandstone or shale, he should know something about this underlying bed.

He should know approximately where the contact is, that is, its elevation. He should know if the two beds lie comformable or if they are unconformable. If the latter, there is a good possibility of the excavating operation encountering the lower bed where least expected.

Electrical soundings can be utilized to determine the location of the lower bed. Fig. 4 is an electrical depth sounding revealing a sandstone layer beneath the quarry beds.

The fact that this underlying bed is sandstone cannot be told from the resistivity graph. That fact was ascertained by outcrops in the vicinity. Knowing that sand-

stone underlies the quarry beds, the problem was to find the depth to the contact from the top of the quarry.

The electrical graphs, similar to that in Fig. 4, revealed the contact, showing that the limestone at this particular location is not thick enough to supply the necessary yardage.

Limitations of Method

Electrical data will not always reveal the contact between limestone and sandstone when the standstone underlies the limestone. This is because the electrical differentiation between sandstone and limestone is not very great when overlain by clay stripping. The electrical characteristics of both the sandstone and limestone are toned or equalized somewhat by the surface layer. However, if a number of depth profiles are taken on the quarry surface, enough of them should reveal the underlying layer to establish the contact.

The thickness of stripping can be determined quite simply with considerable accuracy, because the differentiation between earth overburden and stone is great. If a step traverse is taken to determine the surface of the rock below the stripping, sink holes may give trouble in interpretation of the resistivity profile. Sinks that are void, that is, with plenty of large air spaces, will give anomalies just the opposite in character from the anomalies obtained over clay filled sink holes. This is because clay is a good conductor and the air in the empty sinks is a very poor one.

For Use in Finding Local Materials

It is the writer's belief that the future will see a more and more scientific search for local gravel deposits. In many states the vast state and Federal trunk highway systems are nearing completion. These systems must be maintained, and gravel finds use in shoulder dressing, back filling, etc.

More and more pressure will be brought to bear on the surfacing of town to market and county roads. Because of the vast mileage involved in these secondary systems, the highway revenues must be stretched so as to surface as many miles as possible.

Using local material will be a factor in making these funds reach as far as possible. With many of the existing small gravel pits being exhausted, there is a constantly increasing demand for new deposits.

Resistivity methods can be utilized to a decided advantage in locating certain types of resources, namely gravel deposits that are buried in the vast areas of glacial ground moraine and gravel bars buried in river flood silts.

Buried Gravel Bars

Fig. 5 (lower) shows two resistivity step-traverses across a buried gravel bar. Note how clearly the resistivity traverses show the boundaries of the gravel deposit. The electrode spacing for this traverse was kept at 10 ft. A strong anomaly, therefore, designates gravel that is buried less than 10 ft.

Although this much stripping would condemn many gravel deposits, in country where gravel is scarce every available deposit can be utilized.

Fig. 5 (upper) shows an equi-resistivity map of the buried gravel bar. That is, the resistivity values taken with an electrode separation equal to ten feet are plotted on the map at the place where they were taken. The areas of high resistivity are then outlined and interpreted to be areas of underlying gravel.

In the utilization of electrical surveys in gravel pit work, there is one point that must be explained. Resistivity data cannot distinguish sand from gravel. Electrically they are very similar.

Because they are high in quartz content and, therefore, lack soluble salts, sand and gravel deposits exhibit poor conductivity.

Electrical Reaction Varies

Sands and gravels are electrically very much different from clay and soil, and since most buried gravels and sands are covered and surrounded by clay, ground moraine and flood silt, we are very fortunate in being able to easily differentiate sands and gravels from clays.

Geologically, it is pretty generally true that it is in the areas of clay ground moraine that it becomes necessary to search at greater depths for likely gravel sources.

Once the resistivity highs are located, it requires a little shovel work to ascertain whether the deposit is sand or gravel.

The author has briefly shown how resistivity surveys can aid in the selecting of a likely location for quarry or gravel pits. Because the author's experience has been largely with local materials used for highway purposes, this paper naturally deals more or less with the problems that are before a small, local material operator.

For Reconnaissance

However, resistivity surveys can be used to a decided advantage in reconnaissance for large scale quarry operation, since the subsurface problems are about the same as those confronting a small operator.

The article does not pretend to touch upon the theories and methods of data interpretation. It is enough to say that the obtaining and interpretation of geophysical data must be placed in the hands of a competent and experienced geophysicist.

Sand and Gravel

Becker County Sand and Gravel Co., Crosby, Minn., has obtained a 10-year lease on a piece of property at Glasgow, Mont. (near Ft. Peck dam), to build and operate a sand and gravel plant.

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Nugent Sand Co., Louisville, Ky., on June 8, lost by fire, two dredge boats, two barges, one tugboat, one float and two barges loaded with coal. All of this equipment was wood. Loss was figured at $80,000 to $100,000. The tugboat, valued at $30,000, was reported insured for $5,000 in the name of William J. Nugent. A schedule of $50,000 was carried on other company equipment, including $10,000 on a dredge or derrick boat and $40,000 on warehouse, trestles, trucks, etc.

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Lethbridge Sand and Gravel Co., Hamilton, Ont., has reopened its plant on the river bottom for the summer season and has installed some new equipment and added a trucking service designed to increase the market for its product. With a good outlook for the success of the concern, the company has bought a dragline of sufficient capacity to keep the crushing and washing machinery busy and sufficient to take care of rush orders. This will make the raw material much more readily available to the plant. In addition the trucking arrangement will enable the company to fill orders within 30 miles of the plant with dispatch.

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Cumberland River Sand Co., Nashville, Tenn., has applied for a U. S. Army Engineer permit authorizing the dredging of sand and gravel, the material to be placed ashore for commercial purposes at points along the Tennessee River between Riverton and Chattanooga.

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Hallet Construction Co., Crosby, Minn., is erecting a sand and gravel screening and washing plant at the O'Callaghan gravel pit, west of Dakota, Minn. This firm is furnishing the sand and gravel for the locks on the Mississippi river from Alma, Wis., to Davenport, Iowa. The Dakota plant is under the supervision of L. V. Woods. The material will be hauled by truck to the Dresbach locks. The Allan P. Boyd Co., St. Paul, will do the hauling. Leon Joyce, Rochester, has contracted the stripping of the pit.

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Warner Co., Philadelphia, Penn.: On June 11, it was reported that Wawaset Securities Co., organized by a group of industrialists headed by Charles Warner, president of Warner Co., had acquired the second preferred and common stock of the Warner Company held by the Van Sciver interests, carrying voting control of the company. H. Fletcher Brown, vice-president and director of E. I. du Pont de Nemours Co., is president of new securities company and Charles Warner, Jr., is secretary and treasurer.

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Phosphate Rock

Tampa, Fla.: Loaded with 8,250 long tons of phosphate rock, the Japanese motorship *Columbia Maru* sailed from Tampa recently for Osaka, Japan. The cargo, largest ever loaded here for Japan, was consigned to Mitsubishi Sojo Kaisha, Ltd.

Rock Products News Briefs

Sand and Gravel

Jahncke Service, Inc., New Orleans, La., was low bidder at $21,082, for dredging approximately 225,000 cu. yd. material including overdepth from Mermentau River.

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Consolidated Rock Products Co., Los Angeles, Calif., announces the election of J. C. Buckbee, formerly of Chicago, Ill., as chairman of its board of directors and chief executive officer. Mr. Buckbee needs no introduction to Rock Products readers, since he is an old-time friend and contributor. He was vice-president of the National Sand and Gravel Association last year, is still a member of its board of directors, and was one of the founders of the association. He is known in the crushed stone, and sand and gravel industries as the designer of and consulting engineer on many notable plants, and as the president of the Northern Gravel Co., West Bend, Wis. In the portland cement industry he designed such plants as the Petoskey Portland Cement Co., the Dewey Portland Cement Co. (Davenport), the South Dakota State plant, and was consulting engineer on numerous others. Mr. Buckbee has also been consulting engineer on hydro-electric projects in this country and Canada. Most recently he has been active in establishing the code of the aggregates industries in the Wisconsin and Michigan region. In making the announcement concerning Mr. Buckbee, the management of Consolidated Rock Products Co. stated that it feels substantial progress is being made in the stabilization of its market under the code of the industry.

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Kirten Gravel Co., Benton, Ark.: The Arkansas Corporation Commission issued an order dismissing the petition of the company to require the Missouri Pacific Railroad Co. to replace certain switch tracks to the gravel company's pits. The gravel company contended that the railroad company had removed the switch tracks in violation of a contract, under which the gravel company had leased the tracks for a definite period. The commission held that it had no jurisdiction to pass upon controversies based on contracts between parties where the public interest was not involved and suggested that the petitioner seek relief in the courts.

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Penry Sand and Gravel Co., Radnor, Ohio, has just completed a new plant, which started producing the middle of June. The equipment includes a Sauerman ¾-cu. yd. cableway excavator, Telsmith scrubber and sand tanks, Cedar Rapids jaw crusher, with wood bins.

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St. Louis, Mo.: An aftermath of the attempt to consolidate several sand and gravel companies into two mergers is a suit for $193,054 damages resulting from an alleged breach of contract was filed in Circuit Court by the Ratermann Building & Contracting Co., the Missouri Portland Cement Co., the Mississippi River Sand & Material Co., and five directors of the Standard Building Materials Co. The directors sued are former Mayor Kiel, Collector Edmond Koeln, B. G. Coyle, George Rassieur and Jacob Weisheyer. It is set forth in the suit a consolidation plan was agreed on among several building material firms, including the plaintiff and defendant corporations, for the purpose of effecting economical operation and preventing duplication of effort, yards, offices and overhead. Two corporations, it is stated, were formed in March, 1929, taking over the various firms interested, and were to be merged into one corporation within six months. The two new companies were the Standard Building Materials Co., and the Central Building Materials Co. It is alleged the former company was dominated by the Missouri Portland Cement Co., with appraised assets of more than $3,500,000, and the Mississippi River Sand and Material Co., with $742,000 assets. The Central Co. was composed of five similar firms, including the plaintiff. In the belief that the two holding companies were soon to be merged the petition sets forth that the properties of the Central Materials Co. were allowed to become inactive, resulting in all the business going to the Standard Material Co. However, the merger was never completed because of the refusal of Standard officials to complete the transaction, it is charged. Both corporations were dissolved in 1932 and the properties were returned to the original owners, the petition states. It is contended by plaintiff it is entitled to a share of the Standard's earnings during a three-year period of the former's inactivity. The earnings are said to have been $245,696 in dividends to stockholders, $650,000 in surplus, and $300,000 in improvements within the Standard corporation. The plaintiff figures its share at $93,054, for which it asks judgment in addition to $100,000 exemplary damages. Other firms which were involved in the deal, but which are not parties to the suit, the petition shows, are the Meramec Portland Cement and Material Co., the Alpha Sand Co., the Ruprecht Sand and Material Co. and the St. Charles Sand and Material Co.

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Cement

Lehigh Valley: Delegates from eight Federal Labor Unions affiliated with the American Federation of Labor at a meeting at Bath, Penn., May 26, organized a permanent delegate body representing the cement mills in this district. It was said to be the first group of the kind in the history of the Federation. Thirty-five delegates were present. It was decided to name the new organization "The Conference Board of Cement Mill Employes, American Federation of Labor." The form of organization used by the A. F. of L. in the make-up of central labor unions will be followed by the new conference board.

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Cowell Lime and Cement Co., Cowell, Calif., has installed Ryder dust-collecting equipment at an estimated cost of $60,000 after years of litigation with ranchers in the vicinity of its cement plant.

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Columbia Cement Division, Pittsburgh Plate Glass Co., Fultonham, Ohio, is reported to have reached a satisfactory agreement with its employes' organization known as Local Cement Workers Union, No. 18457, in which the company agrees to pay time and one-half for overtime over 8 hours. A wage increase of 10% became effective June 1 for the hourly wage employes and also piece-workers. The observance of seniority rights was also recognized, but no closed shop agreement was accepted by the company. Mr. Chapell, conciliator from the office of the U. S. Department of Labor, spent several days in Zanesville and brought about this agreement.

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Pennsylvania: Cement mill employes will, in the future, supported by the Pennsylvania State Federation of Labor, take an active part in creating a market for the product of Pennsylvania's cement mills. This is the result of a recent meeting of labor delegates from the cement industry. The delegates adopted a resolution condemning Governor Pinchot for his attitude toward the construction of concrete highways and calling on labor to use its efforts to defeat the Governor should he be a candidate for United States Senator.

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Alpha Portland Cement Co., Easton, Penn., has announced the establishment of a warehouse in Cleveland, Ohio, at the Pennsylvania Railroad East 55th St. freight depot.

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Wabash Portland Cement Co., Detroit, Mich., placed its Stroh, Ind., plant in operation June 1. This plant has not been in use since 1931.

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Alpha Portland Cement Co., Easton, Penn., it is announced, will install the first Miag "Calcinator" in this country at its St. Louis, Mo., plant. This is a device for pre-heating and conditioning slurry before it is fed to the kiln (see Rock Products, May, 1934, p. 66).

Editorial Comments

A Lack of Realism

It would seem that business men often exhibit a lack of realism which prevents direct approach to perplexing problems of "public relations." Realism is "fidelity to nature or real life." Most successful business men are realists except when it comes to dealing with the public; here, perhaps, they are too apt to think that the majority of people are morons without the intelligence to grasp a business point of view. True, the public is often misled by politicians and others adept in the art of influencing public opinion, but that may be due as much to a lack of realistic attitude on the part of business men, as to a lack of intelligence on the part of the average man.

To be specific, a case in point: In Michigan not long ago a group of citizens desired a $38,000,000 bond issue to provide employment on public works, mostly highways. A campaign "to sell" the idea was put on by the governor's employment recovery council, financed, however, by private contributions. How much publicity was given to this feature of the campaign, at the time, we don't know —evidently not any—for recently newspapers all over Michigan have published the list of principal contributors, as if it were a stigma to have thus promoted "selfish private interests." Incidentally, the proposed bond issue was defeated 5 to 1.

Now, if the proposed bond issue, in the opinion of competent business men, was sound, there can be no stigma. If the success of such a measure results in profit to the contributor, and that profit is properly used by being put into circulation, the community is benefited, the state is benefited, and the nation is benefited. We can see no reason why the contributors should have "hidden their lights under a bushel," or should not have found a way to capitalize their contributions through giving the public a better understanding of the fundamentals of business recovery, at the time the contributions were made.

Every one knows that men engage in business for profit, and few begrudge honestly earned business profits. The popular resentment against private business and business men is not directed against men like Henry Ford who have made profits legitimately, honestly and honorably. The popular resentment against business on account of its profits system is based on a misuse of earned profits; and that there have been gross misuse and abuse of earned business profits, no business man will deny.

Another instance is the resentment and embarrassment of government authorities, national, state and local, because of absolutely identical bids on materials for public works. Certainly by this time it should be recognized that the average layman never can get it through his head that there can be uniformity of prices and competition at the same time. What is wanted, and needed for public justification, is some difference in quotations. Contractors on public works long ago recognized this, and in many instances *collusion* made possible the submission of bids sufficiently different to satisfy every one. These contractors took turns bidding low, or divided up the job after the contracts were awarded.

As the matter stands now public works authorities are in most instances getting competition and uniform prices at the lowest possible levels consistent with the possibility of profits; but this is not and never will be satisfactory, no matter what the price level. Whether or not the layman grasps the fact that this method is less susceptible of collusion than the other, he just naturally prefers to see differences in price quotations.

Collusion is a crime because it is defined as "a secret agreement to defraud." But an agreement, secret or otherwise, to provide a variation in prices so that the public may have what it wants need not necessarily be collusion. If prices are fair and the work or material is divided up among the competent, such an agreement may be in the interests of the public, if for no other reason than the prevention of unreasoning popular prejudice against honest business.

Of course, there may be other ways of giving public officials what they so obviously desire, and what producers at the moment so obviously ignore. We are not advocating collusion of bidders, but we believe that an agreement for a *righteous* purpose is entirely justified, and that failure to recognize this is evidence of lack of realism on the part of business men. There has been and still is too much hypocrisy in business intercourse, a reluctance to call things by their right names, a disinclination to approach a matter of policy directly for fear frankness will prove a handicap. Yet frankness is the foundation of confidence building.

The President said in his most recent message to congress, outlining his objectives in general terms: "We have not opposed the incentive of reasonable and legitimate private profit. We have sought rather to enable certain aspects of business to regain the confidence of the public. We have sought to put forward the rule of fair play in finance and industry." The Administration has been fairly consistent in these objectives; although the government itself as a buyer has shown much reluctance to permitting profits to be made at its expense.

It seems all right to many of us for the United States Government to take a benevolent attitude toward the unfortunate unemployed, the poor farmer who never has any knowledge of business, etc., etc., but when it is asked to compel every business man to make a profit in his own business, on the theory or excuse that no one can make a profit unless all are compelled to, it would appear to a realist that there is some foundation for the popular lack of confidence in business men. Genuine business leaders ask only the right to govern their own industries. But many business men are actually, if not vocally, by their acts, asking the government to insure them a profit. These two points of view can not be reconciled by NRA or any other institution.

Combustion Economy in the Rotary Cement Kiln

Part I—Introduction and Historical Background

By Robert S. Schultz, Jr.,
Consulting Engineer, Maplewood, N. J.

THE enormous and rapid development of the portland cement industry in the United States, in fact throughout the World, has been based on the production of a material of great economic value at a cost which permits its universal consumption in large quantities.

Probably the greatest single factor in the low cost production of cement, and certainly the greatest single factor in the production of a quality product, has been the development of the rotary kiln for burning clinker. The development of the rotary kiln has been based on the successful application of fluid fuels, particularly pulverized coal, to the burning of clinker in this kiln.

The original successful application of pulverized coal in any industry was in the cement industry. Its use, however, has spread and it has been particularly successful in the production of steam in large power stations. Its use in boiler furnaces has made possible a study of its combustion in practice as well as in theory. These studies have been carried out, in both boiler room and laboratory, by a large number of highly trained and competent investigators, and a vast amount of practical knowledge and accompanying data have been accumulated and a considerable portion of it published. As a result of this scientific work, the combustion of pulverized coal in boiler furnaces has been reduced to almost an exact science.

The power industry has also devoted considerable study and research to the combustion of fuel oils and natural gases. The published results and data, while less voluminous than for pulverized coal, are no less authoritative and conclusive. Subject to variations resulting from the physical and chemical differences in the fuels, combustion methods developed on pulverized coal have been proven equally efficient on oils and gases.

The cement industry, also, has devoted considerable study to the combustion of fluid fuels but, compared to the power industry, the opportunities have been few and the results have been clouded by the necessity of combining the study of combustion with the profitable production of clinker. As a result, the practical results of this study have been almost negligible and combustion methods developed 30 and 35 years ago, in the infancy of the science, are still in general use in the cement industry.

In most cases, the two industries have carried out their combustion studies separately and there has been little effort by either to apply the knowledge and data of one industry to the problems of the other. It has been contended that the physical nature of the rotary kiln and the necessity of producing clinker introduce factors which make it impossible to apply the knowledge gained in boiler firing to combustion in the rotary kiln. Fortunately, enough work has been done in the cement industry to show the fallacy of this contention and to prove that efficient combustion methods can be used successfully in the rotary kiln to produce clinker of superior quality with notable fuel economy.

Much of the theoretical and practical data on combustion to be used in this article have been derived from boiler practice and from the published results of scientific studies. All of this material can be applied to rotary kiln practice.

Synopsis

THIS series of articles will discuss combustion methods and economies that can be applied to the production of portland cement clinker in the rotary kiln.

The entire discussion will be premised on the production of high quality cement clinker, since without such high quality clinker the most efficient combustion methods can be of no economic value to the industry. Much of the discussion must of necessity be theoretical, but the theory has been developed into practical results in several installations.

Depending on combustion methods now in use and efficiencies now being secured, the combustion methods outlined may be anticipated to yield the following economies:

(1) Quality: An increase in tensile strengths of cement between 25 and 75 lb. per sq. in.

(2) Fuel economy: A reduction in fuel consumption between 150,000 and 500,000 B.t.u. per bbl. of clinker produced.

(3) Kiln capacity: An increase in clinkering capacity between 10% and 25%.

(4) Maintenance: An increase in burning zone lining life between 100% and 300%.

Combustion of the three fuels in general use in cement kilns—pulverized coal, fuel oil and natural gas—will be discussed.

It is hoped that these articles, which are based on twenty-odd years' experience in the cement industry, may show how efficient combustion methods can be applied profitably, and how some of the economies, possible through more complete knowledge, may be secured.

—The Author.

History

Kilns—Portland cement has been known and manufactured for about 110 years, but the real beginning of the modern industry occurred 44 years ago when the first clinker from ground from proportioned raw material burned in a rotary kiln. From a little beginning in a 5 ft. x 25 ft. rotary kiln in 1890, the portland cement industry has grown into one of the major industries of the world.

The first American rotary kiln was a duplicate of the third English kiln. It was erected by the Keystone Portland Cement Co. in 1889 and began operation in November of that year on feed from ½ in. to 2 in. in size. The resultant clinker was not satisfactory. In the following spring, ground and proportioned raw materials were used as feed and the clinker ground to 95% passing a No. 50 sieve. This cement was irregular and quick setting until control of set through addition of gypsum was devised by P. I. Giron, a French chemist, in the employ of the Keystone company. With this addition, rotary kiln cement gradually superseded shaft kiln cement.

Following this successful development, the rotary kiln gradually became popular, but for a number of years installations were limited to small kilns from 5 ft. to 6 ft. diameter and from 40 ft. to 60 ft. long. About 1909 Thomas A. Edison patented a rotary kiln 150 ft. long, and longer, and about the same time, the Atlas Portland Cement Co. built a number of kilns 12 ft. diameter by about 240 ft. long. Since that time there has been little development in accepted rotary kiln design, except in length and in mechanical and structural details. Numerous attempts have been made to improve rotary kiln design—enlarged burning sections, enlarged calcining sections, clinker cooling sections, etc., etc.—but these departures have met with little general recognition in the industry. While none of these improvements has greatly increased rotary kiln efficiency, their lack of recognition has resulted chiefly from a general failure of the cement industry to devote the necessary time and study to kiln and combustion efficiencies in both theory and practice.

A rotary kiln, accurately and scientifically designed to fit the several physical and chemical processes, including combustion, which are involved in the production of cement clinker, is still a dream of the future. Suf-

ficient knowledge of the various processes, of the factors controlling them, and of their influences on kiln design and operation, is available today to permit great improvement in general kiln design and in operating economy.

Fuels—Producer gas was the first fuel used in a rotary kiln but the temperatures possible with this fuel, except with a very high degree of preheat, proved to be too low for the necessary clinkering process on cement clinker.

In the first successful operations of a rotary kiln on cement clinker, crude petroleum oil was the fuel used, and its exclusive use was continued for several years, until a gradual increase in price necessitated the development of a substitute fuel, if the production of a low priced material was to be continued. Pulverized coal was the ultimate substitute, and with its successful application to the requirements of the rotary kiln, the real development of the cement industry began.

With the further development of the petroleum industry and the resulting production of fuel and residue oils, the use of these oils in cement manufacture again became economically practicable. They are in extensive use today as kiln fuel in districts directly tributary to various fields of oil production.

The earliest recorded use of pulverized coal goes back to 1818, but the record does not show the purpose or the results of this earliest experiment. An increasing number of experimental installations for a variety of purposes were made in the following years, but it was not until 1895 that any really successful installations were made. In that year, the famous Hurry and Seaman experiments were concluded and the Atlas Portland Cement Co. began the use of pulverized coal as fuel in the rotary kiln. Since that date, pulverized coal, particularly high volatile bituminous coal, has been the major fuel for burning cement clinker.

In connection with this original use of pulverized coal in the rotary cement kiln, it is of interest, and possibly of value, to quote from the claims made in the first U. S. patent issued for such use. (U. S. Patent No. 645,031, issued March 6, 1900, to Edward H. Hurry and Harry J. Seaman, as filed February 12, 1896, Serial No. 579,049, and assigned by them to the Atlas Portland Cement Co.) In this patent, Claim No. 3 is as follows:

> The combination with a rotary cement furnace, having an elongated combustion chamber, of means for injecting axially thereinto a jet of air of high pressure and small volume, means for feeding into the path of such air jet pulverized carbonaceous fuel suspended in air so as to form a fuel cloud of uniform or substantially uniform density which is carried by and with the air jet into the furnace in a long and relatively compact stream of less cross-section than the combustion chamber, and means for supplying a further volume of air to the furnace whereby a core of pulverized fuel in combustion, surrounded by air to support combustion, is produced in the furnace to uniformly heat the walls of the furnace by radiation without impinging thereon.

In the description of the patented process, the air pressure is exampled as 20 lb. per sq. in. and the volume of air used in the air jet is estimated as about 2% of the total necessary for combustion, with an unestimated additional volume of combustion air being drawn into the kiln by the suction action of the air jet.

From the above as a starting point, the cement industry has continued to follow this general method of combustion in the rotary kiln for nearly forty years, without material improvement in either method or efficiency. The continued use of this method of firing has not been due to any failure to realize the inefficiency of the method or to lack of experiment. It has been due rather to the fact that many of the experiments have been based on inadequate knowledge, particularly of combustion principles; or have been carried to indefinite conclusions; or have been conducted by persons with insufficient knowledge of the methods and needs of the cement industry. The old method, admittedly inefficient, has had the great advantage of burning sound clinker and of producing quality cement. This has not been true of many of the experimental methods.

The first use of natural gas for burning cement clinker occurred about 1904 in the plant of the Iola Portland Cement Co., Iola, Kan. Its use has been continued in plants where this flexible fuel is economically available.

Today, all three of these fuels—pulverized coal, fuel oil and natural gas—are in extensive use for burning cement clinker, and any study of combustion in the rotary cement kiln must include these three fuels if any attempt be made to cover properly the combustion problems of the Portland Cement Industry.

Dr. Geoffrey Martin, in his valuable work on the cement kiln,[1] draws attention to the fact that over-all combustion efficiency in British cement kilns is barely 19%. It is doubtful if the average American kiln is showing any higher combustion efficiency.

(To be continued)

[1]A complete bibliography of references will be published with the concluding installment.

Gypsum

New York City: On one imported shipment of gypsum recently the tariff on 18 tons of the material amounted, at the rate of $1.40 a ton, to $25. The compensating duties assessed against the 421 paper-lined jute bags in which the gypsum was shipped amounted to $40.

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Gypsum, Lime and Alabastine, Canada, Ltd., Montreal, Que., reports for the first four months of the current fiscal year ended March 31, sales showed an improvement of more than 50% over the corresponding period of last year. April business to date is reported as being substantially in excess of last year, with particularly good export orders coming in. The English plant, in which Gypsum, Lime and Alabastine and Honeywill and Stein, a subsidiary of Distillers Co., are interested, was expected to start operations on May 15 and because of continued building activity in England, is expected to contribute substantially to this year's profits.

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United States Gypsum Co., Chicago, Ill.: Sewell L. Avery, president, was one of the 300 leaders in all fields of science and industry invited to the recent Chicago conference by Alfred P. Sloan, Jr., president of General Motors Corp. Their conclusions were (as every one who reads newspapers must know) that progress in this world of ours has not ceased. They outlined enough new developments in the offing to keep this generation and the next busy.

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Lime

Solvay Process Co., New York City, will construct a new alkali plant on the Mississippi River at Baton Rouge, La. The manufacture of alkali or soda ash will require large tonnages of limestone and lime, which the company will undoubtedly quarry and manufacture, as it does at its other plants.

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Kelley Island Lime and Transport Co., Cleveland, Ohio, recently had the experience of having its Kelley Island employes petition the NRA for a 10-hour work day instead of 6 hours, as provided for in the code of the industry. The men explained that seasonal requirements were such that the quarry could be operated only four or five months a year, and that they needed all the work they could get during this short season.

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Kelley Island Lime and Transport Co., Cleveland, Ohio, announces the election of Lawrence Hitchcock as a director of the company. Mr. Hitchcock will be remembered by old-timers in the lime industry as a pioneer manufacturer of hydrated lime.

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Silica Sand

Columbia, S. C.: The state railroad commission by granting a special rate of $1.30 per ton on glass sand from Kingstree to Laurens, S. C., has made possible the development of a deposit at Kingstree in competition with sand previously shipped from Virginia and West Virginia.

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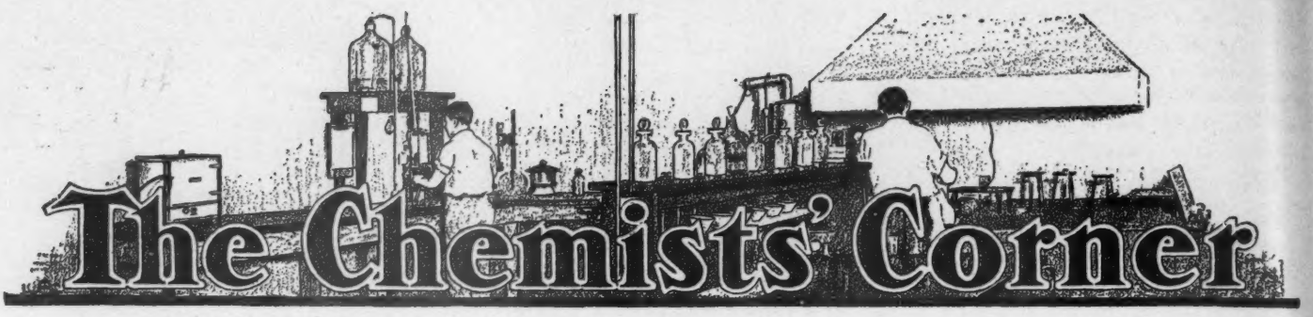
Juda, Wis.: Silica sand deposits in this locality are being explored with the possibility of development. William Reckhow, Albert Ellman and Dr. Robert Wehenn, Rockford, Ill., are reported interested.



Clinker Cooling Studies

The Use of Rotary Cooler as a Regenerator to Improve Quality of Cement Clinker

By H. McC. Larmour,

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FOR MANY YEARS cement manufacture has been aimed largely at the target of an ordinary cement of sufficient quality to meet the specifications of the A.S.T.M. As a result manufacturing operations have been charted by operators on the basis that certain causes are productive of desirable results while other conditions are to be avoided. The intermediate causes have been given little consideration, except that attempts have been made to standardize production units for comparable operation. The result has been a rather standardized practice which demands radical changes if special products to meet special engineering demands are desired. The composition of the cement must be altered, either by means of a chemical change in the materials used, or the process must be altered radically.

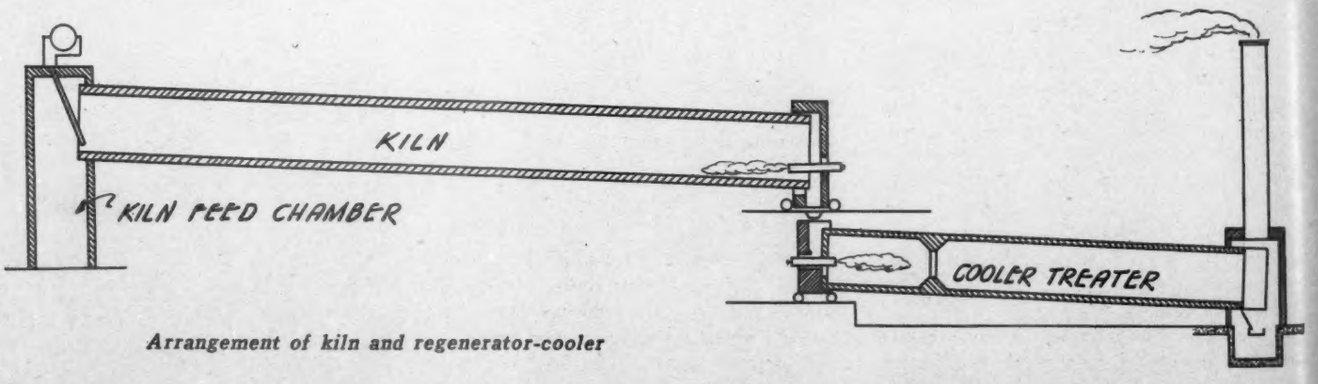
Working on this premise with a desire to produce special products of engineering merit we made a survey of the conditions as practiced, together with the possibilities of change. Composition, we found, had been quite carefully charted by the Portland Cement Association Fellowship at the National Bureau of Standards. Many desirable changes in performance, they showed, could be made by altering the chemical composition of the raw materials, the only difficulty being that cement manufacture is conducted on a large scale from a tonnage basis and must be dependent on local raw materials on account of transportation. Ideal compositions are not always available at economical costs. Therefore, it was evident that a process change would be more desirable, if possible. The obvious conclusion was reached that the steps in the process least understood would most likely prove to be the most prolific field of investigation. The heat system seems to be the answer.

Heat System Analyzed

For purposes of consideration we divided the system into two orders, assuming that the material as introduced to the kiln was passed through a heating process from atmospheric temperature to some 2700 deg. F. and returned to the original starting place for a complete cycle. For convenience, we will take the peak of the curve as the dividing line and consider the burning zone of the kiln as the end of the heating reaction, and the reactions after the material leaves the burning zone to be of the cooling order.

To continue the analysis, most authorities agree that as the material is heated it undergoes a series of reactions. The calcium carbonate of the limestone is decomposed to lime and carbon dioxide, then reactions start between the newly liberated lime and silica present in the mixture, before the material has reached a temperature high enough for any of the constituents to melt. Finally a temperature of about 2300 deg. F. is reached and the iron compounds start to melt. As soon as this occurs reaction proceeds much more rapidly as the constituents of the mixture move about more freely and increased contacts are possible. As the heating continues more of the material melts and the reactions proceed more vigorously. It is not necessary that all of the material melt for complete reaction as we all know that a normal cement clinker burned to no free lime has not been entirely melted, yet all of the material has undergone some reaction.

On the cooling side of our cycle similar reactions take place as the temperatures fall below the melting points of the compounds previously formed. The conditions of cooling will determine what compounds will remain and their nature; they may, or may not, be crystalline. Proper cooling then should constitute a control which will maintain the stability of desirable compounds formed on the heating side of the reaction and, at the same time, remove, or prevent the formation of undesirable compounds. Dicalcium silicate occurs in a number of forms; one at least is undesirable. It is also likely that some of the other major constituents of the clinker may be present in more than one



Arrangement of kiln and regenerator-cooler

form and that some of them are more desirable than others. Cooling the clinker properly should materially improve the quality of the resultant cement, and any radical change in the method of cooling should reflect itself in the resultant clinker.

Cooling Under Reducing Condition

Conditions affecting cooling are rather limited. The only factor likely to affect the clinker from a physical standpoint is the rate of temperature drop. Chemical changes can be made in internal composition or the field may be changed through the range from oxidation to reduction. Oxidation is the normal practice and internal composition has been previously discussed. We therefore decided to investigate the effect of cooling rate and cooling in a reducing condition.

Preliminary tests were made on a laboratory scale. Clinker was removed from a point as near to the burning zone of the kiln as feasible by means of a long handled three-man shovel. Some was cooled rapidly, some cooled slowly and some cooled in the presence of a reducing agent. The tests were made on 300-lb. batches of clinker tested in parallel with a sample of clinker produced according to the scheme of normal manufacture.

In order to evaluate the merit of the various cooling methods the clinkers were ground to cement and tested according to the current specifications of the A. S. T. M. with the addition of either a concrete test or a plastic mortar compression test to indicate a concrete value. A reference standard for the normal performance of an ordinary portland cement was obtained from an average of a set of tests made on samples of six representative Pacific Coast portland cements.

Test Procedure

Tests were then made using a 200-lb. charge of clinker, produced in the normal way to determine a laboratory grind which would approximate the standard performance. The mill employed was 36 in. in length and 22 in. in diameter and was run at 36 r.p.m. The grinding condition finally adopted for the test was as follows: The kiln run clinker was introduced into the mill with 500 lb. of 2 in. balls. A perforated door with openings ⅛ in. x ½ in. was placed in position and the mill rotated until all of the 300 lb. of clinker had been discharged. A revolution counter on the mill was observed, giving an indication of the ease of production of the clinker to a size passing the 8-mesh screen. This material was then thoroughly mixed and a 200-lb. sample of the clinker introduced into the same mill with 1,000 lb. of ⅞ in. balls. The mill was run various periods of time, then the cement removed and tested. Two thousand (2000) revolutions was found to approach the standard sample. This grind was adopted as standard and used in the tests quoted in Table I.

Cement tests were made in accordance with the current specifications of the A. S. T. M. in the matter of 200-mesh fineness, initial set, final set, tensile strength and compressive strength with the addition of a plastic mortar test. The 2x4-in. plastic mortar cylinders are made from a graded sand of about 2.85 fineness modulus. One part of cement is mixed with three parts of sand, and water, corresponding to 60% of the weight of cement, is used for tempering. Correcting for the absorption of the sand, a water ratio of 0.825 by volume is obtained. These mortars do not check all concrete designs of similar water ratio and flow but seem to be a direct function of the resultant strength of the concrete.

TABLE NO. I—TESTS OF CEMENT COOLED IN VARIOUS WAYS

Cooling	200 mesh	Set — Init.	Set — Final	A. S. T. M. 1 day	A. S. T. M. 3 day	A. S. T. M. 28 day	1 day	3 day	28 day
Reference	89.5	2:30	4:30	150	295	390	776	2097	4243
Normal cooling	93.0	2:05	4:15	140	275	450	1146	2650	4456
Rapid cooling	92.4	2:15	3:40	160	300	420	1226	2730	5252
Slow cooling	92.8	2:15	3:50	140	285	390	1094	2674	5157
Reduced	93.8	2:45	4:30	200	325	490	1543	3260	6350

MORTARS

Cooling	1 day	3 day	7 day	28 day
Reference	425	1713	3080	4740
Normal cooling	496	1560	2730	4329
Rapid cooling	653	1910	3300	5100
Slow cooling	700	2120	3240	5230
Cooled with reducing agent	764	2640	4100	6111

Numerous tests were made along the lines of those quoted in Table I. The results quoted are representative of all of the tests, with certain exceptions yet to be discussed. The reduction results were not entirely consistent, yet seemed to give the most promise of ultimate success. In some cases clinkers were produced in the reducing field which were so tough that it was impossible to grind them to a merchantable cement with any reasonable power. The results quoted in Table I were all made on clinker of identical chemical composition as the samples were taken from the kiln concurrently.

The next line of investigation was instituted with the hope of determining the control factors necessary to make the reducing condition consistent in perforance. As temperature is the most important factor in all heat systems the first step was to treat several samples of similar composition with a reducing agent using different initial temperatures of reduction. On account of the toughness of some of these clinkers a longer grinding period—8000 revolutions of the mill—was used in order to obtain a cement from the most rebellious clinker which would have somewhere near normal performance. Table II is rather self-explanatory and answers some of the questions of control:

TABLE NO. II—TESTS OF CEMENT CLINKERS MADE IN VARIOUS REDUCING TEMPERATURES

Reducing Temperature	200 mesh	A. S. T. M. Compressive Strength 1 day	3 day	7 day	28 day
1430	95.5	3629	5411	6430	7385
1390	96.0	2419	4838	6080	6875
1350	96.0	2135	3880	5220	5921
1310	93.0	1210	2865	4420	5000

The temperatures of reduction were determined by means of segar cones imbedded in the mass of clinker and reducing agent. The cones were insulated from reaction by means of a metal container. The samples were taken from the kiln nearly simultaneously in order to eliminate questions of difference in composition and conditions of manufacture involved in the earlier stages. The lower temperatures were obtained by taking the clinker from a point nearer to the kiln discharge. Lower temperatures than those reported were used but the clinker was too rebellious for suitable cement grinding.

As the temperature of producing the reduction was determined to be a factor in the success of such a process a study was instituted to determine whether the method of reaching that temperature was important or not.

Apparatus for Obtaining Reducing Condition

A bee hive kiln was constructed in order that cold clinker could be reheated to various temperatures and tests made on the resultant products. Charges of several hundred pounds of clinker were raised to various temperatures and given treatments, both oxidizing and reducing, and grinds made to test the resultant cement as before. In this case, as in the tests reported in Table II, the 8,000 revolution grind was practiced. A large batch of clinker was set aside and thoroughly mixed to eliminate variables other than those being investigated. A grind was made on the original clinker for reference and on a sample of the same clinker treated at a high temperature as removed from the rotary kiln. Table III (next page) is a tabulation of the results of this test.

It is noted that reheating cold clinker does not give the same degree of activity to the cement for the same temperature that is to be obtained in treating hot clinker. On the other hand, and the fact that a somewhat higher temperature produces results in excess of those shown for the kiln treated clinker, the fact is fairly well established that the higher the temperature of treatment, the better, and that for the most part the quality of the cement is a function of the initial temperature of treatment, or in other words, the nearer it can be treated to the kiln clinkering temperature, the better.

Common burning practice, using any of the

TABLE NO. III—TESTS OF REGENERATED CLINKER

Sample	Temp.	200 mesh	A. S. T. M. 1 day	A. S. T. M. 3 day	A. S. T. M. 7 day	A. S. T. M. 28 day	Concrete 1 day	Concrete 3 day	Concrete 7 day	Concrete 28 day
1.....	Normal	96.5	2037	4138	5760	7655	1140	2746	4009	5401
2.....	990° C.	80.0	775	1289	1926	3400	360	710	1623	3332
3.....	1310	95.5	1527	2546	3836	5873	860	1731	2556	4058
4.....	1430	93.0	1557	2165	3060	5539	724	1752	2342	4336
5.....	1470	97.5	3980	6366	7953	8785	3080	5172	5749	7000
6.....	1430	97.5	3610	6010	6845	7200	2204	3799	4200	5800

three likely fuels, makes treatment at that temperature difficult unless some reheating is effected. Fuel is introduced into the kiln through an orifice small with respect to the diameter of the kiln. As a result the fuel travels some distance back into the kiln before it has expanded to the full opening of the kiln and during that space the clinker traveling out of the burning zone is subjected to a rather severe cooling process. The compounds become set and are not in a responsive condition to treatment with the reducing agent for maximum results. Therefore, when considering large scale operation it is necessary to provide for some means of reheating.

The practice of permitting the clinker to cool unnecessarily is not practicable, as a heat loss is encountered which would make the process prohibitive from a cost standpoint. The experimental work was done to obtain data for designing a commercial installation to obtain the benefits of treatment with a reducing agent during the cooling process.

Tests With Various Lime Percentages

So far the results reported have had to do with essentially the same chemical composition. In order to feel safe in going ahead, changes were made according to lime content, using a low lime mix about 50% dicalcium silicate, a medium lime mix of about 50% tricalcium silicate and a high lime mix of 70% tricalcium silicate. The treated clinker cement in each case ground to a much higher test than the corresponding untreated material.

Commercial Unit Designed

With the above data in mind a commercial unit as shown diagramatically in the illustration on page 40, was made by redesigning the old rotary cooler. The cooler in service at our plant was 95 ft. long and 8 ft. in diameter lined with fire brick for one-half of its length. The conversion to what we have seen fit to call a treater consisted in lining with refractory material throughout the entire length, redesigning the hood so that it is still a feed hopper to receive clinker from the rotary kiln and deliver it to the

TABLE NO. IV—ANALYSES AND TESTS OF CEMENT MADE BY NEW PROCESS

Cement Analysis: Cement No.	Composition Number 1	2	3	4	Avg. 1 year
Silica	21.86	22.38	23.04	23.26	23.02
Iron oxide	2.25	2.34	2.59	2.11	2.09
Alumina	4.09	4.66	4.21	7.07	4.05
Calcium oxide	66.54	66.11	65.15	63.26	66.31
Magnesia	1.64	1.48	1.59	1.42	1.66
Sulfur	2.00	1.97	1.90	1.75	1.52
Ignition loss	1.50	.87	.81	.73	1.19
Uncombined lime	1.00	.80	.60	.90	.50
Insoluble residue	.22	.40	.28	.58	.21
Potential Compound Composition (Bogue's Method)					
C_4AF	6.84	7.63	7.87	6.41	6.35
C_3A	7.02	8.03	6.81	15.16	7.18
C_3S	65.61	56.00	52.06	25.76	55.75
C_2S	12.67	21.35	26.06	45.66	23.30
$CaSO_4$	3.40	3.35	3.23	2.97	2.58

Physical Detail:

Cement Composition No.	Grinding rate bbl. per hour	200-mesh fineness	Init.	Final	Consistency	1 day	3 day	7 day	28 day	1 day	3 day	7 day	28 day
1 Year Average.....	52	93.9	2:40	4:30	24	178	303	384	480	1152	2663	3882	4875
Composition No. I.....	30	94.4	1:20	2:15	24	285	425	470	530	2419	4584	6190	7070
	40	97.5	1:30	3:25	24½	260	375	450	510	2193	4010	5850	7196
	45	96.5	1:15	2:05	24½	255	400	450	500	2037	3820	5665	6684
	50	97.5	2:35	4:45	25	240	375	460	515	1836	3963	4919	7082
	65	95.5	2:20	3:30	24½	175	325	400	500	1620	3510	4585	5937
Composition No. II.....	30	91.9	1:10	2:20	24	280	410	495	515	2355	4322	5838	6730
	50	97.5	1:15	2:05	25	260	405	440	500	1783	4074	5347	6589
	65	91.6	2:00	3:40	24	165	355	400	460	1289	3370	4084	5602
Composition No. III....	44	97.5	2:15	3:45	25	270	400	410	490	1783	3947	4918	6174
	71	94.4	2:30	4:05	24½	185	340	390	475	1273	3183	3820	5284
Composition No. IV.....	60	89.2	1:45	3:50	23½	160	245	290	395	939	1592	1909	3374
	65	88.7	2:30	4:25	24	130	225	260	380	885	1273	1592	3183
Averages—Compositions Nos. I, II and III													
	30	92.2	1:17	2:10	24¾	283	417	483	522	2387	4453	6014	6900
	40-50	97.3	1:45	2:51	24½	257	391	447	503	1927	3962	5340	6735
	65-71	93.8	2:17	3:45	24½	175	338	393	478	1394	3354	4162	5614

Concrete Detail:

Cement Composition No.	Grinding rate bbl. per hour	1.00 Water Cement Ratio Slump	1.00 Water Cement Ratio Compression 1 day	3 day	7 day	28 day	0.80 Water Cement Ratio Slump	0.80 Water Cement Ratio Compression 1 day	3 day	7 day	28 day
1 Year Average.....	52	2½	396	960	1710	2270	3	603	1550	2550	3340
Composition No. I.....	30	2½	626	1682	2500	3310	4	1006	2630	3875	5570
	40	2¾	578	1570	2206	3080	2½	892	2480	3440	4700
	45	2½	518	1265	2126	2840	3	888	2160	3390	4620
	50	2¼	547	1450	1910	2630	3¼	860	2180	3250	4160
	66	2¾	412	1070	1771	2420	2½	684	1760	2980	3620
Composition No. II.....	30	4	600	1625	2300	3650	4¼	925	2490	3440	5300
	50	4	518	1405	1970	2500	4½	825	2175	2970	3940
	65	2¾	490	1235	1810	2410	3	674	1735	2070	3120
Composition No. III....	44	2½	534	1530	2100	2800	3	860	2280	3030	4010
	71	2¼	417	1095	1711	2300	3¼	835	1700	2490	3210
Composition No. IV.....	60	2¼	292	629	1029	1910	3	408	1015	1393	2650
	65	2¼	289	620	907	1725	2¼	424	925	1273	2420
Averages—Compositions Nos. I, II and III											
	30	3¼	613	1653	2400	3480	4¼	965	2560	3658	5435
	40-50	2¾	539	1445	2062	2770	3¼	865	2253	3216	4284
	65-70	2½	443	1133	1764	2377	3	731	1738	2513	3313

cooler or treater as it is now called, and in addition, serve to support a burner.

The discharge end of the treater is enclosed in a housing serving in the same capacity as a dust chamber at the feed end of an ordinary rotary kiln and a stack is mounted on the dust chamber sufficient to produce a draft slightly in excess of that necessary to neutralize the pull of the kiln. In order to help the draft condition the housing connecting the old cooler hood and the kiln hood was altered to give an air column of some 15 in. to assist in breaking the draft condition from the kiln. The feed end of the treater is the end which is used to apply the heat; the discharge end is also the discharge end for effluent gasses. The load and gasses travel in the same direction rather than counter to each other as is common practice in a rotary kiln.

The result of this setup is a reheating device followed by a cooling device built into one tool. As previously shown, clinker coming out of the burning zone of a rotary kiln is subjected to a cooling condition for the last few feet of travel prior to discharge; it cools more as it drops to the treater and for the same reason as noted in the kiln, the first few feet of the treater are of little advantage in reheating the product. Pyrometer readings indicate the drop to vary from 200 to 400 deg. centigrade. It is then necessary to reheat the clinker to a point approaching clinkering temperature of from about 1,000 deg. C., depending on the operation of the kiln.

By using a flame with incomplete combustion, reduction is set up along with the reheating and the gases passing on through the treater with the clinker maintain the condition of reduction until the clinker has reached a temperature where the internal structure is stable in the ordinary understanding of the term. At this time we are using oil as a fuel. Burning the oil with a smoky flame is sufficient for the necessary raise in temperature and at the same time gives an effluent gas rich in carbon monoxide and free carbon, both of which are excellent reducing agents. Coal, coke and wood have been used with equal success and gas is soon to be tried. We have no doubt but that the gas will be a success, based on small scale tests using that fuel as a reducing agent.

Not More Expensive

So far every move we have shown is apparently for a more expensive operation. Actually this has not proved to be the case. Burning fuel in the treater is, of course, a tangible increase in cost. Lining the treater for 95 ft. costs more than lining it for 45 ft. and a fire requires some attendance. Analysis of the facts show, however, that even in the burning operation these are largely offset by economies. Leaving out the hot air from the old cooler makes for slower combustion in the kiln and as a result makes for a longer and less intense flame. This fact distributes the heat and has actually affected a 50% increase in the life of kiln linings. The cost of refractory material, labor and lost operating time will buy a large amount of fuel. The actual treater fuel consumption has varied through the range of 0.3 to 0.5 gal. of oil per bbl. of cement, using an oil with a heat value of 18,560 B.t.u. The matter of treater refractory cannot be checked at this time on account of insufficient operation, but it is indicated that it will last for several hundred thousand barrels, which will make for a rather negligible cost figure per barrel. The attendant labor is no more than previously with the old cooler installation as that device required one man's attendance from a mechanical standpoint. The small flame does not materially increase his duties.

TABLE NO. V—COMPARISON OF NORMAL AND TREATED CLINKER CEMENTS

Production	Kiln oil/bbl.	Finish bbl./hr.	Tensile 1 day	Tensile 3 day	Tensile 7 day	Tensile 28 day	Compression 1 day	Compression 3 day	Compression 7 day	Compression 28 day
Normal ..	10.11	50.72	178	302	380	463	1090	2644	3710	5100
Treated ...	10.30	65.04	203	305	411	504	1166	3015	4163	5504

Better Clinker

The treated clinker bears a marked difference from ordinary clinker which may be noted in several ways. To the naked eye the most important difference is color. By controlling the amount of reduction the color may be varied from gray through grayish tans to a dark brown. We have adopted an intermediate shade as a standard. In addition broken surfaces show a different type of surface, being more grainy and indicating larger crystals than is true with normal clinker.

The clinker is as hard as normal clinker but is much more fragile. A single blow from a light hammer will cause the treated clinker to fly into many more and smaller pieces than a similar blow would produce with a normal clinker. The preliminary reduction of the treated clinker is accomplished more easily with a resulting beneficial effect on the final grind. In addition to this benefit test grinds of sized material show that surface area is much more rapidly increased with treated, than with untreated clinker.

Table IV gives quite a comprehensive set of tests covering an investigation to indicate the possibilities of the process from a manufacturing standpoint and on a manufacturing scale. The commercial grinding units employed in our plant are 7x26-ft. Allis-Chalmers compeb mills of the two-compartment type. The mill rates were obtained by grinding into an empty bin and sacking the resultant grind with Bates packers. A minimum of six hours was used for the individual test after surface area had reached a constant. The chemical analysis covers a fairly wide range; Samples No. 2 and 3 approach the yearly average quoted for reference close enough to be consistently comparative. The only major constituents not varied to an appreciable amount were iron and magnesia. Raw materials were not available for this purpose. Composition 4 is one which would not normally be encountered in commercial practice, but was designed on account of its probable rebelliousness to grinding.

The physical detail sheet needs little or no comment other than to note that for the same grinding rate, increases of approximately 30% are maintained, while a 30% increase in grinding rate produced a cement of approximately the same strength performance as before.

The concrete detail follows the A. S. T. M. strength tests closer than would be normally expected. The concrete design included graded aggregate of 1 in. maximum size, water ratios of 1.0 and 0.8 by volume respectively and 5.25 and 6 sacks per cu. yd.

The tests quoted in Table IV were made soon after the installation was completed for a basis for selection of the commercial products to be manufactured. Two cements were selected for manufacture — a high-early strength cement called "Oneday," to be ground at a rate of 30 bbl. per hour, and a standard product to be ground at 65 bbl. per hour.

Table V covers the comparative manufacture for one year's operation with normal clinker and nine months of operation with treated clinker.

These data show an increase of 28.2% in grinding rates with the same power and labor cost in the finish mill and an increase of about 10% in the strength of the resulting product.

It was impossible to take full advantage of the increased grindability of the clinker from an economic standpoint on account of the transportation equipment available from the finish grinding mills to the storage bins; 130 bbl. per hour, or 65 bbls. each for two mills, is the practical limit of our pumping equipment. Grinds involving the use of one mill have demonstrated that 71 bbl. per hour may be produced of a quality equaling previous operation at 51 bbl. per hour, showing an increase of 41%.

Table VI shows the corresponding comparison for the production of "Oneday" cement.

In this case the strengths are comparative but the grinding rate has been increased by 48.2%.

Several attempts have been made to analyze the reactions involved in the reduction of the clinker during cooling. No positive facts

TABLE NO. VI—COMPARISONS OF NORMAL AND TREATED HIGH EARLY STRENGTH CEMENTS

Production	Finish bbl./hr.	Tensile 1 day	Tensile 3 day	Tensile 7 day	Tensile 28 day	Compression 1 day	Compression 3 day	Compression 7 day	Compression 28 day
Normal	20.1	300	405	475	550	2700	4850	6130	7450
Treated	29.8	310	403	468	560	2675	4900	6210	7620

have been developed, but of the studies so far attempted the most interesting has been a study of the relative heat of solution of treated and untreated material.

Relative Heats of Solution

A calorimeter has been constructed to determine the heat of solution of ground clinker or cement in a 10% solution of hydrochloric acid. The calorimeter is equipped for mechanical agitation and temperature observations are made with a Beckman differential thermometer. The acid solution is introduced into the calorimeter and agitated until a constant radiation rate is accomplished, usually not more than 0.005 deg. C. per minute. The ground sample is then introduced and temperature observations made with respect to time until maximum has been passed. The process usually takes from 10 to 12 minutes. The rise in temperature corrected for radiation is easily transferred to calories per gram of material by means of previously determined heat constants. The degree of total solution is checked by a determination of the insoluble residue and a correction applied.

The following table, No. VII, gives the result of that study:

TABLE NO. VII—RELATIVE HEATS OF SOLUTION OF NORMAL AND TREATED CEMENTS

								——Heat of Solution——			
Sample	Silica	Iron	Alumina	Lime	Magnesia	Loss	Free CaO	Insol.	Normal	Treated	Diff.
1....	23.96	2.53	4.99	65.44	1.72	.74	.00	.43	519	486	—33
2....	22.32	2.41	4.85	67.20	1.82	.54	.00	.50	572	531	—41
3....	26.88	2.30	5.18	62.73	1.41	.81	.00	.77	504	450	—54
4....	28.00	2.34	4.94	61.67	1.55	1.03	.00	1.08	468	432	—32
5....	22.80	5.86	5.02	63.09	1.38	.92	.00	.43	522	490	—32
6....	22.48	7.53	4.87	61.67	1.72	.89	.00	.52	512	465	—47
7....	21.82	9.01	4.51	60.73	1.41	1.10	.00	.62	500	452	—48
8....	22.63	2.59	6.67	65.06	1.82	.77	.00	.36	528	492	—36
9....	20.80	5.74	4.48	66.48	1.30	.74	.00	.42	567	508	—59

The results quoted quite definitely establish that the heat of solution is lower by an appreciable if not mathematically consistent amount when the clinker is subjected to reduction, than is the case otherwise. The ordinary oxide analysis of the two materials checks within experimental error. It is, therefore, likely that the crystallization of the materials is the only property affected. If less uncrystallized material is present then it is likely that the clinker would be held together more loosely and make for the more ready reduction noted in the finish grind.

Conclusions

It is usually granted that reaction of three or more orders is involved in the formation of a portland cement clinker—namely: solid solid, solid liquid and liquid liquid, with perhaps some additional orders involving vapor phases. The extent of the various orders of reaction is a function of the amount of each phase present and the time for completion of the reaction. The result would likely only affect the ratio of crystals to under-cooled melt in the clinker. The reducing condition is essentially active, we believe, on account of the increased time permitted for reaction in the liquid liquid and liquid solid orders due to the fact that a reducing condition materially lowers the melting point of some of the compounds involved. This would tend to make more of the material crystalline, with a possibility of changing their system. The lower heat of solution would indicate to some extent more crystals and we might explain the difference as due to the difference represented by the latent heat of crystallization.

The following definite conclusions may be drawn:

The cooling system of cement manufacture can be controlled to produce clinker with marked properties of increased grindability.

If a reducing condition is used it must be practiced close to the clinkering temperature of the material considered if desirable results are to be obtained.

Clinker may be toughened by treatment at too low a temperature with a reducing agent.

That the same standard of quality can be accomplished with treated clinker at a lower cost than can be maintained with untreated clinker is evidenced by the increase in grinding rate from 52 barrels per hour to 65 barrels per hour, with an increase in strength.

That reduction is the basis for the production of cements of several distinct colors desirable for architectural effect.

Cement

New York State: Press gave much publicity to 10% wage increases for all employes of the cement companies in the Hudson-Alsen district effective June 1. The new rate is in excess of code requirements.

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Universal Atlas Cement Co., Chicago, Ill., has entered into an agreement with the West Michigan Dock and Market Corp., Muskegon, Mich., for storage and distribution of cement throughout a wide territory in western Michigan. Cement will be received by lake steamshps from Buffington, Ind., and Duluth, Minn.

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Colorado Portland Cement Co., Florence, Colo.: A workman suffered a unique accident while trying to jack up an electric motor. A button on his overalls caught on the motor in such a way as to establish an electric contact and his clothing was set on fire.

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South Dakota State Cement Plant, Rapid City, S. D., has succeeded in having its freight rate to Glasgow, Mont., put on a parity with competing plants so that it may bid on cement requirements for the Ft. Peck dam.

◆ ◆ ◆

North American Cement Corp., Howes Cave, N. Y., resumed operation at full capacity, May 24. J. W. Campbell made good use of the opportunity to get some very favorable newspaper publicity. He is quoted in the *Schenectady* (N. Y.) *Gazette* as follows:

"During the slack months of the past years," said Mr. Campbell, "odd jobs of construction helped the men on the plant's payroll eke out a living. In addition the company allowed rent gratis to its men living in its 35 company-owned houses here in Howes Cave, all of which were erected prior to 1925. The men now on the payrolls come from all parts of Schoharie county, and some are even coming to work here from Schenectady, making the trip each way every morning and night, while others board at local lodging places. It's pretty fortunate for some of the men that the plant's operating again. Many of them have been practically out of work since the depression hit, with the plant operating only intermittently since 1929."

Needless to add, this is just the kind of publicity that will eventually drive home to the public that there is good in private industry, in spite of much propaganda to the contrary from Washington, D. C., and elsewhere.

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Lehigh Portland Cement Co., Iola, Kan., was scheduled to begin operation shortly after the first of June.

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Canada Cement Co., Ltd., Montreal, Que., is reputed to be the real purchaser of the unused cement plant at Marlboro, Alta. The plant was sold in May to Montreal Trust Co. The plant has not operated for a number of years. One local report was to the effect that the Marlboro plant might be used for the manufacturing of gypsum products, though some doubt is felt concerning that development. Gypsum beds have been discovered in Jasper park but the purity of the deposits has not been established. Beds also exist at Fort McMurray and on the Peace river.

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Florida Portland Cement Co., Tampa, Fla., recently filed suit for $60,000 against a defunct contractor customer and his surety company for material furnished to construct a federal-aid highway in Florida.

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Petoskey Portland Cement Co., Petoskey, Mich., will lose its contract to supply the city with electric power at 2c per kwh., according to the *Detroit Free Press.* This plant has waste-heat power in excess of its own requirements and has sold this excess to the city. The city has recently bought and developed hydro-electric power to meet most of its requirements.

Digest of Foreign Literature

By F. O. Anderegg, Ph. D.
Consulting Specialist, Pittsburgh, Pa.

The Discoverer of Sand-Lime Brick. It seems that Prof. Michaelis was not the actual discoverer of sand-lime brick. According to G. E. Bessey of the British Building Research Station at Barston, the first patent for making a sand-lime brick was taken out by G. E. VanDerbaugh in England in 1866. He appreciated the importance of securing the formation of a calcium hydrosilicate by the aid of steam. A patent for a similar process was taken out in Germany by Zernikow in 1877. But both of these patents required a long period of reaction and involved allowing to stand in the air. Michaelis secured his patent in 1880 in which he disclosed the present-day process of subjecting the pressed sand-lime brick to high steam pressure in a closed vessel requiring only hours instead of weeks as in the earlier proposals.

More Sensitive Apparatus for Measuring Volume Change. It is suggested by Ad. Pogany that with the use of an optical lever a sensitivity of 1/3000 mm. can be obtained with the Bauschinger apparatus. A small metal mirror is fastened to the movable indicator and parallel beams of light are reflected back on to a scale on the wall.—*Tonindustrie Zeitung* (1934) **58**, No. 35, pp. 428.

Light Weight Clay Aggregate for Concrete. Friedrich Huth describes the manufacture of a double burned clay aggregate. The clay is first mixed with about 55% brown coal or sawdust and then pressed into rods and cut up. The lumps fall on a shaking screen on which they roll slowly downward acquiring an approximately spherical shape. Then they fall into the first kiln where the combustible is burned out, leaving much porosity. Next they pass on another shaking screen where they are brought into contact with fresh clay which coats them completely. After drying this layer with warm air, the shapes are passed into a rotary kiln 20 meters long, where the temperature is raised to 1,100 deg. C. These spheres now have a hard burned surface about half a millimeter thick which reduces their absorption rate greatly. For making concrete, which is done best mechanically, 1 part of cement, 1 of sand, and 4 of burned clay aggregates are mixed with about 20% their weight of water. Compressive strengths ranging from 1,400 to 3,500 lb. per sq. in. are claimed.—*Tonindustrie Zeitung* (1934) 58, No. 34, pp. 418.

Dispersion Behavior of Monocalcium Aluminate in Aqueous Solutions. A large number of researches as to the status of the nature of the chemical products formed when monocalcium aluminate hydrates have failed to yield a well established result. Therefore, Prof. Hans Kühl has carried out a research aided by Fredrich Thilo and A. Chi Yu, bringing potentiometric and conductivity measurements to the aid of analytical determinations. They soon ran into the difficulty of securing true equilibrium, even after 100 days. Shaking monocalcium aluminate and dilute limewater for 72 days and then allowing it to stand for 28 more, the solution contained in mg. per liter, CaO, 360 and Al_2O_3, 163. Of the latter, 54 mg. was present in the colloidal condition. These values are lower than previously reported due to making correction for the colloidal alumina. In several of the previously published researches equilibrium had not been obtained. In others where commercial cement was used, the lime content was affected by the presence of alkalies from the cement.—*Zement* (1934), **23**, No. 18, pp. 249.

Iporite Lightweight Building Units. A porous concrete is being used to a considerable extent in Germany for house construction. The mixture contains 1 volume of cement to 3 of sand, the gas forming Iporite being added first to the sand, then the water, followed by the cement and a suitable quantity of 38 deg. Bé water glass added slowly. After mixing, the concrete can be poured into forms or used for the floor. It is readily screeded and trowelled. It is said to reach a compressive strength of about 350 lb. per sq. in. in 28 days, with a unit weight of about 85 lb. per cu. ft. It conducts little more than half as much heat as a brick wall. The cost is said by the author, A. Karsten, to be rather low, ranging from about 5 to 7c a square foot.—*Zement*, **23**, No. 18, pp. 256.

Evolution in Strength of Portland Cement in Past 12 Years. Edmund Marcotte summarizes results obtained in France as follows: Percentage increase for the years 1931-3 over years 1919-21.

Storage period....	2	7	28	90 days
Tensile increase...	700	70	55	15%
Compressive inc..	500	250	120	70%

The greatest increases come at the earliest ages, especially with the tensile strength. *Revue des Materiaux de Construction et de Travaux Publics* (1934), No. 295, pp. 97.

Low Grade Cement Suggested. Before the A. M. Institute C. E. a paper presented by Alan Moncrieffer stimulated considerable discussion, the account of which reads much like listening in on a C-1 meeting. The principle speaker suggests that standard British cements are constantly increasing in tensile strength, far exceeding standard specifications. In addition, they have high early strength cements; but he is inclined to feel that for a great many purposes the strengths obtained are considerably greater than required. Therefore, he proposes that three classes of cement might be sold: 1-Star, 2-Star, 3-Star. In the discussion, it was pointed out that the savings anticipated would hardly be realized. It was emphasized that the properties desired in concrete are complex and it would require a great deal of research, with careful consideration of the particular application, before being able adequately to design or specify a cement. It was suggested that the 1-Star cement might be so low in lime as to reduce appreciably the danger of leaching out of lime by percolating waters, and in this connection the benefits of pozzuolans and blast furnace slags should receive careful consideration. *Cement and Cement Manufacture* (1934), 7, No. 4, p. 91.

Sand-Lime Brick Production and Shipments in May, 1934

THE following data are compiled from reports received direct from producers of sand-lime brick located in various parts of the United States and Canada. The accompanying statistics may be regarded as representative of the industry.

Eight sand-lime brick plants reported for the month of May, this number being four less than the number reporting for the month of April, 1934, statistics for which were published May 25:

Average Prices for May

Shipping point	Plant price	De-livered
Saginaw, Mich.	11.00	.....
Dayton, Ohio	10.00	12.00
Mishawaka, Ind.	8.50	.....
Grand Rapids, Mich.	.....	12.00
Syracuse, N. Y.	16.00	20.00
Toronto, Ont., Can.	12.00	13.50

Statistics for April and May

	†April	*May
Production	436,500	1,340,150
Shipments (rail)	29,000	59,500
Shipments (truck)	1,005,625	1,345,712
Stocks on hand	1,518,443	1,323,693
Unfilled orders	705,000	605,000

*Eight plants reporting; incomplete, four not reporting unfilled orders.
†Twelve plants reporting; incomplete, three not reporting unfilled orders.

Portland Cement Yardage

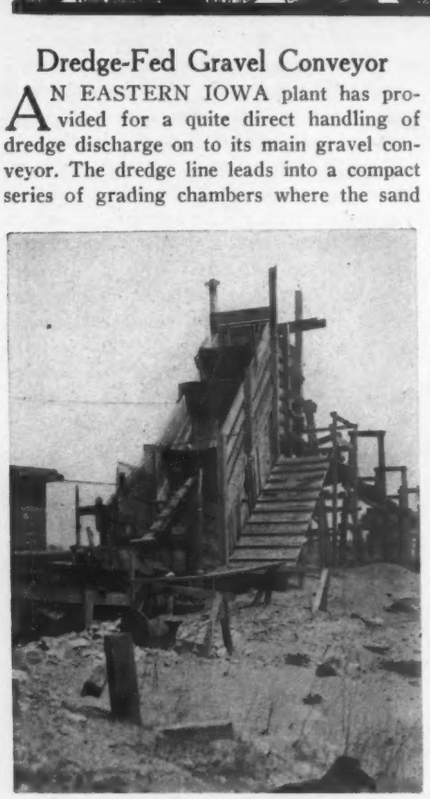
AWARDS of concrete pavement for May, 1934, are announced by the Portland Cement Association as follows:

	Sq. yd. awarded during May, 1934	Sq. yd. awarded to date, June 2, 1934
Roads	2,200,195	10,292,642
Streets	1,547,839	6,736,042
Alleys	4,233	43,200
Total	3,752,267	17,071,884

Hints and Helps for Superintendents

Dredge-Fed Gravel Conveyor

AN EASTERN IOWA plant has provided for a quite direct handling of dredge discharge on to its main gravel conveyor. The dredge line leads into a compact series of grading chambers where the sand



Gravel belt receiving its load from dredge-discharge chambers

is separated and shunted to a sump with a suction line leading into the plant.

After this initial separation, the gravel falls directly on the incline belt conveyor for delivery direct to the final cleaning and sizing units in the plant, about 200 ft. distant.

Quarry Paving

SEVERAL CRUSHED STONE OPERATORS have paved portions of their quarry so as to speed up truck transportation and to reduce the wear and tear on truck equipment. Among these might be mentioned the Clinton Point plant of the New York Trap Rock Corp., which has a concrete pavement; the Weston & Brooker Co., Camak, Ga., which has a bituminous pavement, and the Consolidated Quarries Corp., at Lithonia, near Atlanta, Ga. At all the operations only the arterial lines of traffic are paved and around the primary crusher.

The Lithonia operators took advantage of their own material for paving these lines of traffic, having cut sufficient granite paving blocks to pave the necessary portions of the quarry floor.

The stone is a massive gray granite and for years similar stone in the district has been shipped for dimension and decorative stone and the trimming of the paving blocks presented no problem as the stone has the proper fracture, etc. The paving blocks are shown in the illustration.

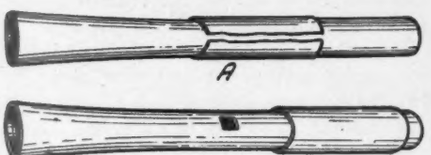
A Modified Cordeau Coupling

By L. B. Reifsneider,
Cowan, Tenn.

THERE ARE probably very few powder men that have not at some time in their experience wished they could see the joint where two lines of Cordeau meet inside a coupling, especially when they were going over the joints and connections for the last time before pulling a shot.

With a sharp knife and a small flat file (preferably 8 in.) a modified form of coupling may be made from a solid coupling and the wish gratified. With a knife cut ½ in. off the end of a solid coupling and split this ½ in. piece longitudinally on one side.

Take another coupling and with the edge of the file cut an opening or fenester through the shell on one side, midway between the two ends, trimming the edges of the cut carefully so that no metal remains inside the bore of the coupling to interfere with the



Cordeau coupling units

joining of the two ends which are to be coupled.

Now slip the split ½-in. piece over the outside of the coupling with the split side opposite the fenester.

The two ends of the cordeau are prepared as usual, slipped into the coupling and joined in front of the fenester where they are plainly visible and the coupling crimped as usual. The short piece is then slid along to cover the fenester, making it water tight.

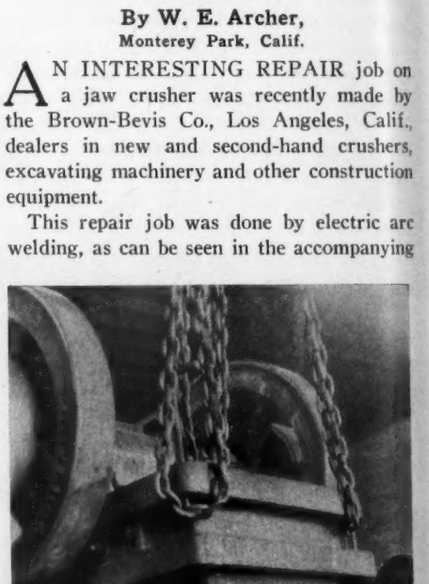
The cover may be slipped aside at any time it is desired to inspect the joining.

Welding Effects Saving Rock Crusher

By W. E. Archer,
Monterey Park, Calif.

AN INTERESTING REPAIR job on a jaw crusher was recently made by the Brown-Bevis Co., Los Angeles, Calif., dealers in new and second-hand crushers, excavating machinery and other construction equipment.

This repair job was done by electric arc welding, as can be seen in the accompanying



Crusher unit after welding

illustration, which shows the repaired portion of the crusher ready for loading for the return trip to the plant. The front lower

Granite paving blocks for quarry floor

base of the frame was broken off about 5 in. back from the end, as can be noted by the weld in the photo. This broken casting, about 24 in. in length, ranged from 3 to 6 in. in thickness, and was broken in two pieces. Also a crack extended about 8 in. from the lower edge of the broken piece to about the middle, which was also welded.

The main weld was made by V-ing out both sides and inserting studs, a procedure essential to assure added strength in the welded area. Holes were drilled stagger fashion in both the beveled edges about every 2 in., in which the studs were inserted preparatory to the welding operation. By this procedure greater strength for this part of the frame was assured, which was a feature quite essential at this point in view of the fact that it was in close proximity with the crushing jaws. Six welding "beads" were required in building up the weld metal to finish this job, which consumed approximately 30 lb. of the welding metal. The crack in the middle of the casting, as seen in the illustration and also as mentioned above, was welded by first V-ing out and building up by the electric process of welding in the usual and customary manner. No preheating whatever was required on this job. The entire time required to do the welding was about six hours.

The total cost of the repairing, including dissembling and reassembly, did not exceed $60, according to statements of those handling the job.

Crane Atop Stock Pile

FINDING it necessary to return crushed stone from stock piles to its plant for rescreening and loading into cars, the Lehigh Stone Co., Kankakee, Ill., recently employed an unusual method.

A 30-ton Koehring crane, equipped with 50-ft. boom and clamshell dragline bucket, was taken under its own power to the top of a large stock pile. From that point (see illustration) it delivered stone to a hopper above a conveyor line running into the main conveyor gallery into the plant. The Caterpillar tractor-mounted crane went up on a "switchback"—about 30% grade.

For purposes of this temporary operation, the stock piling conveyor line was reversed, of course, and the need for a special elevator unit to handle material from "'switchback"—up a grade of about 30 per cent, was eliminated.

Shovel Bottom Used as Baffle Plate

By Dare Paris,
Monrovia, Calif.

IN THE accompanying illustration is shown a means of protecting the sides of a bunker from wear by the use of a baffle plate which consists of the bottom of a discarded shovel bucket. The baffle plate is suspended from a steel bar by U-bolts. The bunker shown is installed over the reduction crusher and receives the rejects through a long steel lined chute from the scalping screen above.

Bunker protection

The stone ranges in size up to 4 in. and comes down with considerable force.

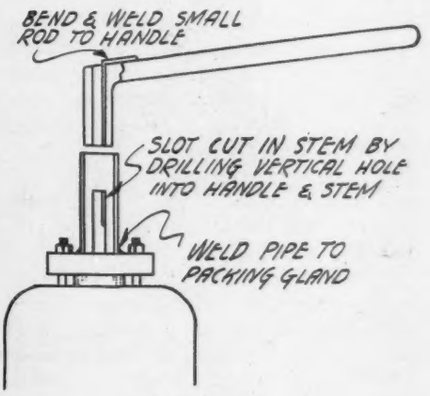
The baffle plate should hang so that the stone will strike about 12 in. above the bottom edge. With the large size stone striking at this point the baffle plate will swing freely and receive less wear.

Before the baffle was hung the steel lined sides of the bunker would pound out in a very short time, which would mean a considerable cost in a year's time. This has been in use about four years and has practically eliminated the wear on the bunker.

Controlled Valve Adjustment

By Charles Labbe,
Death Valley, Calif.

THE outlet of a large tank was regulated by a valve which only one man had the right to change, but other workmen would go unseen to the valve and change the setting, resulting either in the tank being empty or running over. Alibis made the situation unpleasant and a remedy was found in the way of turning the stem.



Keyed valve

The square part of the hand wheel and nut was sawed off. For a wrench, a piece of round iron was bent square and drilled to fit the stem. A slot to act as keyway was drilled half in the wrench and half in the stem, a light rod with the wrench acting as key.

To the packing gland was welded a piece of pipe extending 2 ins. above the valve stem to prevent the use of a pipe wrench.

Now there is no change of adjustment at that valve without the proper wrench from the man in charge.

Conveyor line, loaded by crane unit, with conveyors reversed to take stone from stock piles to plant

Sand and Gravel Directors Meet in Chicago

THE ANNUAL MEETING of the board of directors of the National Sand and Gravel Association in Chicago, Ill., June 5 and 6, was well attended and the discussion covered all phases of association activity. While recognizing the importance of Code Authority activities and its demands on producers for financial support, it was the unanimous opinion of all present that the association should be continued as at present, and if possible greater efforts should be made to continue research and promotion. All felt that trade associations would take a more prominent part in industrial self government with the passing of time.

At this meeting three additional directors were provided for to represent the newly organized industrial sand division, and ways to make the association helpful to this group of sand producers were discussed at length. One of these ways is to deal with the silicosis problem, which it was believed would sooner or later face all sand and gravel producers.

Other recommended activities, of benefit to all producers, are the cultivation of better public relations, particularly with the end in view of combating the unfair competition of public authorities in the production, and in some cases the sale, of sand and gravel.

Executive Secretary, V. P. Ahearn, discussed at length pending legislation at Washington and the probable effects on the industry. Subsequent events show that he was a pretty good "predicter."

The code came in for some discussion. The universal opinion was that the code was doing some good, but there were skeptics as to how much good, and as to how long it would last.

Stanton Walker, director of the engineering and research division of the association outlined the research activities, or rather the present need of them, and the desirability of having additional laboratory assistance, because his own time was so much occupied with code activities.

The time and place of the next annual convention was left to the executive committee, to be worked out in coöperation with the executive committees of the National Crushed Stone Association and the National Slag Association, as it was deemed that concurrent conventions of the three associations would again be highly desirable. It was also the opinion of the directors that the time was ripe to hold another exhibit of the manufacturers' division, which was omitted at the 1934 conventions.

Harold V. Owens, president, Utica, N. Y., presided, and the following directors and producer guests were present: G. W. Renwick, vice president, Chicago, Ill.; H. S. Davison, secretary-treasurer, Pittsburgh, Penn.; H. N. Battjes, Grand Rapids, Mich.; Otto S. Conrades, St. Louis, Mo.; R. C. Fletcher, Des Moines, Ia.; Alex. Foster, Jr., Philadelphia, Penn.; D. D. Guilfoil, Chicago, Ill.; C. S. Huntington, Chicago, Ill.; V. O. Johnston, Lincoln, Ill.; W. H. Klein, Nazareth, Penn.; R. S. McDougall, Ottawa, Ill.; A. J. Miller, New York City; C. F. Mullens, Cleveland, Ohio; M. A. Neville, Lafayette, Ind.; John Prince, Kansas City, Mo.; F. W. Renwick, Chicago, Ill.; J. M. Settle, Louisville, Ky.; H. N. Snyder, Buffalo, N. Y.; E. Guy Sutton, Mattoon, Ill.; A. Warsaw, Chicago, Ill.

Messrs. McDougall, Miller and Warsaw represented the industrial sand producers.

Ready-Mixed Concrete Directors Propose Change in Dues

THE DIRECTORS of the National Ready-Mixed Concrete Association, meeting in Chicago, Ill., June 4, decided to continue the association on a broader base. Hitherto dues have been on a yardage basis, with $50 a year for associate (machinery) members. The new basis is to be $15 per year for both classes of membership.

It is proposed to concentrate the activities of the association more particularly on technical committee work in coöperation with the American Concrete Institute, the American Society for Testing Materials, the Portland Cement Association, etc.

There are 170 ready-mixed concrete producers under the code of the industry, representing 90% of the production, and it is believed that with dues of $15 a year all of these should find it possible to support the association.

TVA Puts Some Life Into Tennessee Phosphate Industry

(Contributed)

MINING PHOSPHATE actually began for the TVA in April on the F. S. Wheeler property of about 450 acres in the Southport region south of east from Mt. Pleasant, where the total deposit is being removed from the mine and spread out on the ground for sun-drying, the oldest method practiced in the Mt. Pleasant field 38 years ago.

It is reported, without verification, that the contract price for this is on the basis of $1.60 per ton for three-mile haul and 10c per mile thereover, making $2.50 in this case, or with royalty added, $3.00 f.o.b. cars, basis 72 per cent, with deduction of 1c per unit below that figure. It is said to be expected that this deposit handled as above will run about 66 per cent B.F.L., and it will probably have from 3 to 5 per cent moisture at time of loading. With 4 per cent moisture this will give a net content of about 29 per cent phosphoric acid, which with $2.25 published present freight rate, will give a phosphoric acid cost in the crude rock at Muscle Shoals of a little less than 18c per unit.

Of course, any such figures as above cannot be achieved and pay NIRA wages, but if as reported by Llewellyn Evans at the TVA Institute in Chattanooga, recently, blast furnace plants will be finally located at strategic points in the phosphate field, and all will have a valuable byproduct of electric power to sell, it can be readily seen that very much cheaper phosphoric acid is in sight from Tennessee than has ever been known before, when the TVA experiments are finally worked out to successful conclusion.

The activities of the TVA and of several fertilizer companies, one of the large electric furnace producers of phosphoric acid, and of several unidentified aggregations of independent operators, in leasing and optioning phosphate lands of every grade and kind throughout Maury, Giles and Williamson counties, with some in Lewis and Hickman counties, has caused a marked appreciation in the values of phosphate land.

Every possible coöperation is being given the TVA by the community in the hope that some revival of the major industry here, may come from their efforts, to relieve the depression which has been worse in this section than most places, because of the low point to which phosphate mining had dropped for the past three years.

Recent press reports state that the International Agricultural Corp., through its local manager, Oscar Dortch, purchased an estimated $135,000 worth of phosphate lands during the month of April alone; that the Swann Chemical Co., of Anniston, Ala., is employing 200 men in prospecting in Williamson County, where it has taken options on 25,000 acres of land, and contracted for a railroad spur and manufacturing plant site from the Franklin Limestone Co.; that the TVA has taken options on approximately 500 acres in the same vicinity, coupled with the long known recent activities of the same parties and others in the Maury and Hickman County fields. These are sufficient to explain the interest of those speculatively inclined in the prospect of getting hold of the present obtainable property to be ready for the buyers sure to follow any boom. The same press reports tell of "steel

to be smelted by the electric phosphate furnace method" and of a "number of important chemical byproducts from the steel smelting" and from "the phosphoric acid fertilizer concentrates process." They also mention the TVA's "new blast furnace that will manufacture fertilizer from the phosphate rock and at same time throw off heat for generation of steam power electric current as a byproduct."

The recent report of Dr. A. E. Morgan on the TVA to the President says:

"In the preparation of phosphates the program may require that part of the manufacturing process should be at the phosphate beds, either within or without the Tennessee Valley."

One of the largest aggregations of phosphate lands outside of the regular operating companies has been in the hands of the Chancery Court, seeking a sale for some time, without success. The company will probably now be reorganized under the new law permitting reorganizations of bankrupt corporations, by issue of new securities, and this will give an opportunity for the large number of stockholders to get something and probably the bondholders to be more fully recouped, instead of the entire estate being absorbed by tax liens and court costs. Whenever there is a market again for phosphate lands, this will be an extremely valuable property.

Cement

Statistics: The portland cement industry in May produced 8,554,000 bbl., shipped 8,731,000 bbl. from the mills, and had in stock at the end of the month 21,345,000 bbl., according to the U. S. Bureau of Mines. Production in May showed an increase of 36.6% and shipments an increase of 30.1%, as compared with May, 1933. Portland cement stocks at mills were 6.1% higher than a year ago. In the following statement of relation of production to capacity the total output of finished cement is compared with the estimated capacity of 163 plants at the close of May, 1934, and of 164 plants at the close of May, 1933.

RATIO (per cent) OF PRODUCTION TO CAPACITY

	—May—		Apr.	Mar.	Feb.
	1933	1934	1934	1934	1934
The month	27.4	37.5	29.6	23.0	20.2
The 12 months ended	26.0	26.7	25.9	25.0	24.4

Preliminary figures on output of special cements in the United States in 1933 as reported by producers to the Bureau of Mines show the following:

High-early-strength portland cement produced in the United States in 1933, as reported by producers, amounted to approximately 1,072,000 bbl., and shipments from the mills, 1,096,000 bbl., valued at $2,193,000, an average per bbl. of about $2.00. Corresponding figures for 1932, from final reports of the producers, follow: Produced, 1,287,586 bbl; shipments, 1,105,191 bbl., valued at $1,915,215, an average per bbl. of $1.73.

Masonry cement, of the portland-cement class, reported produced in 1933: Approximately 386,000 bbl.; shipments from mills, 395,000 bbl., valued at $535,000, an average per bbl. of about $1.35. Corresponding figures for 1932, from final reports of the producers, follow: Produced, 433,332 bbl.; shipments, 442,038 bbl., valued at $581,255, an average per bbl. of $1.31.

Miscellaneous special cements (including so-called "Oil-well" and "High-Silica" portland cements and cement manufactured under the trade name "Super") produced in 1933: Approximately 807,000 bbl.; shipments, 754,000 bbl., valued at $1,314,000, an average per bbl. of about $1.74. Corresponding figures for 1932, from final reports of the producers, follow: Produced, 413,644 bbl.; shipments, 340,494 bbl., valued at $577,175, an average per bbl. of $1.70.

Current Statistics of Lime Shipments

THE CODE AUTHORITY of the Lime Industry is now publishing monthly statistics of shipments and average prices which should prove of much practical value to all lime manufacturers. A summary for the first quarter of 1934 is given in the accompanying table:

TOTAL SHIPMENTS AND CAPACITY[1]

Month—1934	Total Capacity Represented (short tons)	Total Shipments Reported (short tons)	Average value (per ton)
January	392,636	112,437	$7.31
February	406,215	111,506	7.17
March	392,806	143,699	7.50

Ratio Shipments to Capacity (Per Cent)

	United	Lime Manufacturing Districts											
Month—1934	States	1	2	3	4	5B	6-8-9	7	10-11	12	13	14	15
January	28.6	12.2	19.4	39.6	26.3	33.0	23.8	38.1	43.0	36.1	23.4	17.4	17.1
February	27.4	9.7	19.3	35.7	25.5	38.4	18.3	35.9	37.2	42.9	25.5	26.2	18.5
March	36.5	15.5	35.1	47.8	40.4	31.7	25.3	48.2	40.3	49.4	24.7	52.4	26.4

[1]All data relate only to competitive lime. Total capacity under Table 1 includes the following capacity reported as idle: January, 12,687 tons; February, 14,150 tons; March, 7,313 tons.

Detailed statistics for each month are given in the second table (exclusive of finishing hydrate).

TOTAL SHIPMENTS BY USE AND GRADE[1]

	Agriculture		Building[2]		Chemical		Total	
January—1934	Tons	Per Ton	Tons	Per Ton	Tons	Per Ton	Tons	Per Ton
Quicklime—Bulk	216	$ 5.48	2,333	$ 7.99	66,650	$ 6.04	69,199	$ 6.10
Barrels	23	18.78	2,805	16.02	1,187	15.98	4,015	16.02
Bags	308	8.22	2,406	11.42	3,522	9.15	6,236	9.98
Hydrate	3,171	8.61	11,062	8.78	18,029	8.00	32,262	8.33
Total	3,718	$ 8.46	18,606	$10.12	89,388	$ 6.69	111,712	$ 7.32
February—1934								
Quicklime—Bulk	326	$ 4.93	1,578	$ 8.55	70,850	$ 6.05	72,754	$ 6.10
Barrels	33	21.03	2,132	15.19	1,053	15.83	3,218	15.46
Bags	242	12.05	1,674	12.30	3,658	9.84	5,574	10.68
Hydrate	2,435	8.83	7,238	8.94	19,715	7.99	29,388	8.29
Total	3,036	$ 8.80	12,622	$10.39	95,276	$ 6.70	110,934	$ 7.18
March—1934								
Quicklime—Bulk	542	$ 5.87	3,341	$ 8.55	79,326	$ 6.02	83,209	$ 6.12
Barrels	269	17.53	3,625	16.39	1,542	15.74	5,436	16.26
Bags	1,730	10 29	2,572	12.11	5,050	9.62	9,352	10.43
Hydrate	9,695	8.54	10,570	9.09	24,152	8.10	44,417	8.43
Total	12,236	$ 8.87	20,108	$10.70	110,070	$ 6.78	142,414	$ 7.51

[1]Table 2 does not include the following Miscellaneous Lime: January, 725 tons; February, 572 tons; March, 1,285 tons.
[2]Building hydrate includes no finishing lime.

New NRA Rules for Bidding

UNDER A NEW ORDER by NRA Administrator Johnson, all industry is exempted from code provisions which conflict with statutory provisions governing the bidding on contracts to supply goods or services to the United States Government or its political subdivisions. However, Mr. Johnson announced that nothing in this new order would permit deviation from open price and cost protection provisions in codes or allow exemption from any other code provisions than those immediately concerned with such bidding.

Notwithstanding code prohibitions, bidders may, under the new order:

(1) Quote prices and terms of sale to government agencies as favorable as those permitted to any commercial buyer.

(2) Quote definite prices or sale terms, not subject to adjustment resulting in increased costs during life of the contract.

(3) Quote prices and terms to apply on contracts to become effective not more than 60 days from date of opening of bids.

(4) Quote prices f. o. b. point of origin and/or f. o. b. destination.

Recent Quotations on Rock Products Securities

Stock	Date	Bid	Asked	Dividend
Allentown P. C., com.[47]	6-26-34	4½	5½	
Allentown P. C., pfd.[47]	6-26-34	5	6½	
Alpha P. C., com.	6-25-34	14½	15	
Alpha P. C., pfd.[47]	6-26-34	85	90	$1.75 qu. June 15, 1934
Amalgamated Phos. 6's, '36[47]	6-26-34	97	100	
American Aggregates, com.[48]	6-17-34	1	2	
American Aggregates, pfd.[48]	6-17-34	5	15	
American Aggregates, 6's, 1st mtg. 3/6's, 1943, new[48]	6-17-34	40	45	
American Aggrs., 6's, '43, old[48]	6-17-34	41F	46F	
American L. and S., 1st 7's[48]	6-17-34	75	....	
Arundel Corp., com.[48]	6-17-34	17	19	25c qu. July. 2, 1934
Bessemer L. and C., Class A[47]	6-26-34	....	3	
Bessemer L. and C., 1st 6½'s, 1947	6-26-34	28	....	
Bessemer L. and C., cert. of dep., 1947	6-26-34	26	....	
Bloomington Limestone 6's[47]	6-26-34	9	11	
Boston S. and G., new com.[37]	6-17-34	1	2	
Boston S. and G., new 7% pfd.[37]	6-17-34	5	10	
Boston S. and G., 7's, 1934[37]	6-17-34	50	....	
California Art Tile, A[9]	6-16-34	1	2	
California Art Tile, B[9]	5-15-34	....	½	
Calaveras Cement, com.	6-21-34	1	1⅛	
Calaveras Cement, 7% pfd.	4-12-34	47½	75	$1.75 qu. Jan. 15, 1934
Canada Cement, com.	6-18-34	7¼	actual sale	
Canada Cement, pfd.	6-18-34	44	actual sale	
Canada Cement, 5½s, 1947	6-19-34	93½	95	
Canada Crushed Stone bonds[42]	6-17-34	75	nominal	
Canada Crushed Stone, com.[48]	6-17-34	5	nominal	
Certainteed Products, com.	6-25-34	5¾	6	
Certainteed Products, pfd.	6-25-34	29	31	
Certainteed Products, 5½s, '48	6-26-34	63⅛	....	
Cleveland Quarries	5-26-34	5	10	
Consol. Cement, 1st 6½'s, '41[47]	6-26-24	20	22	
Consolidated Cement, pfd.[47]	6-26-34	1	2	
Consolidated Oka S. and G. (Canada) 6½'s[12]	6-23-34	22	25	nominal
Consol. Rock Prod., com[47]	6 26-34	½	1	
Consol. Rock Prod., pfd.[47]	6-26-34	1	2	
Consol. Rock Prod., units[47]	6-26-34	2	3	
Construction Mat., com.[47]	6-26-34	1	2	
Construction Mat., pfd.[47]	6-26-34	2	4	
Consumers Rock & Gravel, 1st Mtg. 6½'s, '48[47]	6-26-34	28	32	
Coosa P. C., 1st 6's[47]	6-26-34	10	20	
Coplay Cement Mfg., pfd.[47]	6-26-34	6	8	
Coplay Cement Mfg., 6's, '41[47]	6-26-34	45	50	
Dewey P. C., com.[47]	6-26-34	70	80	
Dolese and Shepard	6-26-34	10½	11½	
Dufferin Pav. & Cr. Stone, com.	6-18-34	3	actual sale	
Dufferin Pav. & Cr. Stone, pfd.	6-18-34	30⅛	actual sale	
Edison P. C., com.[47]	6-26-34	1	2	
Edison P. C., pfd.[47]	6-26-34	2	4	
Federal P. C. 6½'s, 1941[47]	6-26-34	30	33	
Florida Port. Cement 6½s, '27[46]	6-21-34	75½	76½	
Florida Port. Cement Units[47]	6-26-34	6	7½	
Giant P. C., com.[47]	6-26-34	2	4	
Giant P. C., pfd.[47]	6-26-34	14	17	
Gyp. Lime & Alabastine, Ltd.	6-18-34	7	actual sale	
Gyp. Lime & Alabastine 5½'s, 1948	6-19-34	78½	80½	
Hermitage Cement, com.[47]	6-26-34	5	10	
Hermitage Cement, pfd.[47]	6-26-34	35	40	
Ideal Cement 5's, 1943[47]	6-26-34	100	102	
Ideal Cement, com.	6-26-34	29	32	25c qu. July 1, 1934
Indiana Limestone 6's[47]	6-26-34	12	15	
International Cement bonds, 5's, 1948	6-26-34	92½	....	
International Cement, com.	6-25-34	25⅝	25½	
Kelley Island L. and T.	6-26-34	10	12	15c qu. July 1, 1934
Ky. Cons. Stone, 6½'s, 1933	5-26-34	5	6	
Ky. Cons. Stone, com.[47]	6-26-34	1	2	
Ky. Cons. Stone, pfd.[47]	6-26-34	3	5	
Ky. Cons. Stone, 7% pfd.[47]	6-26-34	3	5	
Ky. Cons. Stone, 1st Mtg. 6½'s[48]	6-21-34	7	....	
Ky. Cons. St. V. T. C.[47]	6-26-34	1	2	
Ky Rock Asphalt, com.[48]	6-21-34	½	½	
Ky. Rock Asphalt, pfd.	5-26-34	6	8	
Ky. Rock Asphalt 6½'s, '35	5-26-34	....	58	
Kentucky Stone, com.[47]	6-26-34	....	½	
Kentucky Stone, pfd.[47]	6-26-34	....	5	
Lawrence P. C.	6-25-34	11½	14½	
Lawrence P. C., 5½'s, 1942[47]	6-26-34	71	74	
Lehigh P. C., com.	6-25-34	15	16	
Lehigh P. C., pfd.	6-25-34	73⅝	77	87½c qu. July 2, 1934
Louisville Cement[47]	6-26-34	70	75	
Lyman-Richey 1st 6's, 1935[47]	6-26-34	95	100	
Marbelite Corp., com. (cement products)[40]	5-14-34	7½c	....	
Marbelite Corp., pfd.[40]	5-14-34	60c	....	
Marquette Cement, com.[47]	6-26-34	14	16	
Marquette Cement, pfd.[47]	6-26-34	50	55	
Marquette Cem. Mfg. 1st 5's, 1936[47]	6-26-34	80	90	
Marquette Cem. Mfg. 1st 6's, 1935[48]	6-21-34	97	....	
Material Service Corp.[47]	6-26-34	3	5	
McCrady-Rodgers, com.[47]	6-26-34	7	10	
McCrady-Rodgers, 7% pfd.[47]	6-26-34	45	50	
Medusa P. C., com.[47]	6-26-34	9	11	
Medusa P. C., pfd.[47]	6-26-34	35	40	
Michigan L. and C., com.[47]	6-26-34	60	65	
Missouri P. C.	6-26-34	7	7½	
Monarch Cement, com[47]	6-26-34	90	100	2% Mar. 15, 1934
Monolith P. C., com.[9]	6-16-34	1½	2	
Monolith P. C., 8%, pfd.[9]	6-16-34	4½	5	25c June 10, 1934
Monolith P. C. units[47]	6-26-34	13	15	
Monolith P. C., 1st Mtg. 6's[9]	5-15-34	83	88	
Monolith Portland, Midwest pfd.[9]	6-16-34	35c	50c	
National Cem. (Can.), 1st 7's[42]	6-17-34	90	nominal	
National Gypsum A, com.	6-25-34	9¾	10¼	
National Gypsum, pfd.	6-25-34	79	81	$1.75 qu. July 2, 1934
National Gypsum 6's[47]	6-26-34	85	90	
National L. & S., 6½'s, 1941[47]	6-26-34	80	85	
Nazareth Cement, com.[47]	6-26-34	4	7	
Nazareth Cement, pfd.[47]	6-26-34	25	30	
Newaygo P. C., 1st 6½'s, 1938.	6-26-34	50	55	
New England Lime 6's, '35[14]	6-17-34	10	15	
N. Y. Trap Rock 1st 6's, 1946.	6-25-34	55	actual sale	
N. Y. Trap Rock, 7% pfd.[46]	6-28-34	60	subject	
North Amer. Cement 1st 6½'s[47]	6-26-34	20	25	
North Amer. Cement, com.[47]	6-26-34	1	2	
North Amer. Cement, 7% pfd.[47]	6-26-34	2	4	
North Shore Mat. 1st 6's[47]	6-26-34	50	55	
Northwestern States P. C.	6-25-34	15	15¾	$1.50 Jan. 2, 1934
Northwestern Port. Cem., units[9]	5-15-34	37	40	
Ohio River S. and G., com.	5-23-34	....	5	
Ohio River S. and G., 1st pfd.	5-26-34	26	....	
Ohio River S. and G., 2d pfd.	5-26-34	....	20	
Ohio River S. and G., 6's[48]	6-21-34	7F	....	
Oregon P. C., com.[47]	6-26-34	5	10	
Oregon P. C., pfd.[47]	6-26-34	40	50	
Pacific Coast Aggr., com.[40]	5-14-34	....	10c	
Pacific Coast Aggr., pfd.[40]	5-14-34	....	15c	
Pac. Coast Aggr., 6½'s, '44[40]	5-14-34	18	20F	
Pacific Coast Aggrs., 7's, '39[40]	5-14-34	2	5F	
Pacific Coast Cement 6's, '37[40]	5-14-34	49	51	
Pacific P. C., com.[9]	6-16-34	4½	5½	
Pacific P. C., pfd.[40]	5-14-34	34	38	
Pacific P. C. 6's, '35[40]	5-14-34	97	100	
Pacific P. C. 6½'s, pfd.	6-18 34	34	38	
Peerless Cement, com.[47]	6-26-34	....	½	
Peerless Cement, pfd.[47]	6-26-34	1	2	
Penn.-Dixie Cement, com.	6-25-34	4¾	5	
Penn.-Dixie Cement, pfd.	6-25-34	22½	23½	
Penn.-Dixie Cement, 6's A, '41.	6-25-34	72¼	actual sale	
Penn. Glass Sand Corp., pfd.[47]	6-26-34	70	75	$1.75 July 1, 1934
Penn. Glass Sand Corp., 6's[47]	6-26-34	97	100	
Petoskey P. C., 6's, '41[48]	6-17-34	47	....	
Petoskey P. C., 6's, 1935-'38	6-26-34	55	65	
Petoskey P. C., com.	6-26-34	2	3	
Port Stockton Cem., com.[9]	5-15-34	no market		
Republic P. C., 6's, 1943[47]	6-26-34	65	70	
Riverside Pt. Cement, A[9]	6-16-34	8	9	20c May 1, 1934
Riverside Cement, B[9]	5-15-34	1	2	
Riverside Cement, 1st pfd.[9]	6-19-34	80	83	$1.50 qu. May 1, 1934
Rockland and Rockport Lime, 1st pfd.[47]	6-26-34	2	3	
Sandusky Cement 6's[47]	6-26-34	55	65	
Sandusky Cement 6½'s, 1932-1937[47]	6-26-34	55	65	
Santa Cruz P. C., com.[9]	5-15-34	50	53	$1.00 qu. July 1, 1934
Schumacher Wallboard, com.[47]	6-26-34	1	3	
Schumacher Wallboard, pfd.[9]	5-15-34	1½	3	
Signal Mt. P. C., com.[47]	6-26-34	1½	3	
Signal Mt. P. C., pfd.[47]	6-26-34	14	18	
Signal Mt. P. C., 6's, '36[47]	6-26-34	80	85	
Southwestern P. C., units	6-25-34	150	....	
Standard Paving & Mat. (Canada), com.	6-18-34	2⅛	actual sale	
Standard Paving & Mat., pfd.	6-18-34	21	actual sale	
Superior P. C., A[9]	6-16-34	27½	30	55c July 1, 1934†
Superior P. C., B[9]	6-16-34	....	7½	
Trinity P. C., units[47]	6-26-34	22	27	
Trinity P. C., com.[47]	6-26-34	2	5	
Trinity P. C., pfd.[47]	6-26-34	20	25	
U. S. Gypsum, com.	6-26-34	44¼	45	25c qu. July 2, 1934
U. S. Gypsum, pfd.	6-26-34	134¼	139½	$1.75 qu. July 2, 1934
Wabash P. C.[47]	6 26-34	7½	10	
Warner Co., ww., 1st 6's[47]	6-26-34	25	35	
Warner Co., ex.w., 1st 6's[47]	6-26-34	25	35	
Warner Co., com. (sold at auction Philadelphia)	3- 7-34	2½	actual sale	
Warner Co., pfd. (sold at auction, Philadelphia)	3- 7-34	7½	actual sale	
Whitehall Cem. Mfg., com.[47]	6-26-24	30	35	
Whitehall Cem. Mfg., pfd.[47]	6-26-34	50	55	
Wisconsin L. & C., 1st 6's, '38[47]	6-26-34	95	100	
Wisconsin L. & C. 6½'s[47]	6-26-34	95	100	
Wolverine P. C., com.[47]	6-26-34	1	2	
Yosemite P. C., A, com.[46]	6-21-34	1¾	2½	

Quotations by: [9]A. E. White Co., San Francisco, Calif. [12]James Richardson & Sons, Ltd., Winnipeg, Man. [14]Securities Co. of Milwaukee, Inc., Milwaukee, Wis. [37]Wise, Hobbs & Arnold, Boston. [40]Martin Judge, Jr., and Co., San Francisco, Calif. [42]Nesbit, Thompson & Co., Toronto. [46]First National Bank of Chicago, Chicago, Ill. [47]Anderson Plotz and Co., Chicago, Ill. [48]Hewitt, Ladin & Co., New York, N. Y.

F—Flat. †The payment is on arrears and leaves accumulated unpaid dividends of $1.92½ a share.

Recent Dividends Announced

Alpha Portland Cement, 7% pfd. (qu.)	$1.75	June	15, 1934
Arundel Corp. (qu.)	.25	July	2, 1934
Ideal Cement Co. (qu.)	.25	July	1, 1934
Kelley Island Lime and Transport Co. (qu.)	.15	July	1, 1934
Lehigh Portland Cement Co. 7% pfd. (qu.)	.87½	July	2, 1934
Monolith Portland Cement 8% pfd. (accumulative)	.25	June	10, 1934
National Gypsum, 7% pfd. (qu.)	1.75	July	2, 1934
Pennsylvania Glass Sand Corp $7 cum. pfd. (np.)	1.75	July	1, 1934
Santa Cruz Portland Cement (qu.) (par $50)	1.00	July	1, 1934
Superior Portland Cement, Inc. (accumulative) Class A (np.)	.27½	July	1, 1934
Superior Portland Cement, Inc., Class A (mo.)	.27½	July	1, 1934
United States Gypsum Co., com. (qu.)	.25	July	2, 1934
United States Gypsum Co., pfd. (qu.)	1.75	July	2, 1934

Cement Company Bonds: The *World Telegram* (New York City) in a signed article by its financial writer, Albert L. Ettlinger, says: "Fixed obligations of cement companies comprise only a small classification of the corporate bond list, but, because of the improvement that has been noted in the condition of this industry, have lately attracted increased investment interest. The 5% loan of the International Cement Corp. due in 1948 is probably one of the best known of this group, but there are several other issues with which the public is familiar, including Pennsylvania-Dixie Cement 6s of '41. An upward earnings trend has materially helped the situation in the industry in the current year, following betterment in the last six months of 1933. No doubt the bonds in question have more appeal because of the fact that the season of increasing consumption is now at hand. Demand for cement, it is believed, will show substantial gains in the current year. This is due in part to the outlook for substantial projects under the public works program and also to forward strides anticipated in connection with privately financed building."

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Arundel Corp., Baltimore, Md., reports net income, after depreciation, federal taxes, etc., for the five months ending May 31, of $254,265, against $174,437 for the same period in 1933. Earnings per share were 51c., compared with 35c. in 1933. The regular quarterly dividend has been declared, payable July 2.

National Gypsum Co., Buffalo, N. Y.: ANNUAL REPORT of M. H. Baker, president, contains the following:

Earnings were $272,751.64 for the year ending December 31, 1933, after allowance for Federal taxes, bond interest, depreciation and depletion. This compares with $231,478.58 for 1932 and reflects an increase of $41,273.06.

Current assets on December 31, 1933, including $626,147.02 in cash and government bonds, amounted to $1,184,764.21. Current liabilities, including accrued Federal taxes, were $110,779.54. This compares with cash and bonds of $561,584.92, current assets of $1,116,976.71 and current liabilities of $82,495.49 at the end of the preceding year. Working capital was $1,073,984.67 which compares favorably with $1,034,481.22 for 1932.

The company was among the first to adopt shorter working hours and higher wages as required under the President's Reëmployment agreement. This resulted in an increase in number of employes and likewise an increase in operating expenses for the last half of the year.

The organization has coöperated fully in the development of codes regulating trade practices and labor for the industries covered by our various lines of business. While we look for considerable good from these codes ultimately, it is too early to forecast their effect on our income for the current year.

The past year has seen the company take several long strides towards its original goal —to be the outstanding factor in the wall and ceiling material field. Entry into the industry was marked with the introduction of a stronger and lighter gypsum wallboard, immediately forcing the industry to emulate these qualities, and automatically placing National in a favorable competitive position.

Since that day the company has never relaxed its research efforts for the ideal gypsum board. Last summer the company's engineers brought into successful production an entirely new process for making wallboard another 20% lighter, at the same time increasing the strength and insulating qualities. The management regards this as one of the important wallboard developments in recent years. Broad patent claims have been allowed and two patents have already been issued.

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Ideal Cement Co.: Will pay 102 and interest to July 1 for all of its outstanding debentures, amounting to $3,280,000, if holders wish to surrender them, a Denver, Colo., dispatch states. The company has been buying bonds of its own in the open market and has thus reduced its indebtedness by nearly $900,000. Reports given directors indicated that cement shipments were running 40% ahead of last year. It was also decided to pay the regular quarterly dividend of 25c. a share of July 1 to stockholders of record June 15.

North American Cement Corp., New York City, reports for 12 months ended March 31, 1934, net loss of $734,070, after taxes, depreciation, depletion, interest and amortization, comparing with net loss of $804,810 for the 12 months ended March 31, 1933.

For the calendar years 1933 and 1932 the corporation reports:

	1933	1932
Net sales	$1,524,586	$1,736,652
Cost of sales	819,311	1,145,100
Selling and other expense	484,093	498,412
Net profit	$ 221,181	$ 93,140
Other income	6,658	11,141
Total income	$ 227,839	$ 104,281
Interest and mortgage on bonds	173,005	285,009
Depreciation and depletion	777,173	649,719
Federal taxes	.....	.....
Other deductions	.....	.....
Provision for loss on cash in closed banks	20,000	.....
Net loss	$ 742,340	$ 830,447
Preferred dividends	.....	.....
Deficit	$ 742,340	$ 830,447
Earnings on preferred shares	Nil	Nil

Assets as of December 31, 1933, were $12,356,712 against $13,774,584 the year before; cash was $322,088 against $362,870 on December 31, 1932. On the asset side of the balance sheet surplus was increased from $1,146,446 on December 31, 1932, to $6,147,642 on December 31, 1933, by financial reorganization.

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Lyman-Richey Sand and Gravel Co., Omaha, Neb.: All the 6% first mortgage bonds, due June 1, 1934, and June 1, 1935, have been extended for a period of five years from date of maturity.

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Santa Cruz Portland Cement Co., San Francisco, Calif., reports balance sheet as of December 31:

Assets:	1933	1932
Property and equipment, (net)	$4,387,112	$4,448,384
Real estate, etc.	81,575	81,575
Investments	2,605,477	3,066,727
Current assets:		
Cash	20,442	29,731
Accounts and bills receivable	649,656	290,919
Inventories	447,418	441,941
Total	$8,191,679	$8,359,277
Liabilities:		
Capital stock (par $50)	$5,000,000	$5,000,000
Current liabilities:		
Accounts payable	177,958	118,952
Bag account	115,937	114,057
Surplus	2,897,784	3,126,268
Total	$8,191,679	$8,359,277
Current assets	$1,117,516	$ 762,591
Current liabilities	293,895	233,009
Working capital	823,621	529,582

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Batesville White Lime Co., Batesville, Ark., reports sales and earnings for the years ended December 31:

	1933	1932
Sales	$146,667	$120,728
*Net loss	581	2,456
†Earned per share, com.	(d)$1.65	(d)$2.16

Number of common shares, 6,000.
*After charges. †Disregarding preferred arrears.

	1933	1932
*Current assets	$ 33,479	$ 36,415
Current liabilities	52,464	57,370
Working capital	(d)18,985	(d)20,955

*Includes cash: 1933, $5,717; 1932, $13,286.

Preferred dividends were in arrears $47,250 on December 31, 1933.

TRAFFIC and TRANSPORTATION

Proposed Rates Changes

THE FOLLOWING are the latest proposed changes in freight rates up to and including the week of June 16:

New England

33041. **Agricultural lime,** also **limestone,** burnt or unburnt, ground, C. L., minimum weight 40,000 lb., from Winooski, Vt. In cents per net ton.

To Ogdensburg to Madrid, Incl., proposed, 200; Norwood to Churubusco, Incl., 190; Clinton Mills to Champlain, Incl., 180. Present—Representative—Norwood, N. Y., agricultural lime, 239; limestone, 227. Reason—To permit the movement of the traffic involved.

33046. **Agricultural lime** and **ground limestone,** in straight or mixed C. L., minimum 50,000 lb., to St. Leonard, N. B.

From	Pres.	Prop.
Winooski, Vt.	52	22
Fonda Junction, Vt.	46	22
Swanton, Vt.	46	22

Reason—To enable the tonnage to move.

Trunk

Sup. 1 to 32078. **Limestone, ground or pulverized and limestone dust,** C. L., min. wt. 50,000 lbs., from Jordanville, N. Y., to D. L. & W. R. R. stations—Scranton, Penn., Elmira, Corning, Avoca, Wayland, McGraw, Norwich, Paris, West Winfield, South Cobia, N. Y., and various. Rates ranging from 95c to $2.20 per net ton.

32388. **Sand,** in open top cars, without tarpaulin or other protective covering, C. L., (See Note 2), from Mapleton District, Penn., to Pen Argyl, Bangor and East Bangor, Penn., $1.90 per net ton. Reason: Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

32310. Amend Rate Proposal 32310 covering **sand and gravel,** C. L., (See Note 2), from Hopatcong Jct. and Kenvil, N. J., to Lehigh Valley Railroad stations, by adding Lackawanna stations, Kenvil, Succasunna and Netcong, N. J., as origin points at same rates as proposed from Hopatcong Jct. and Kenvil, N. J., i. e., $1.20 to $1.60 per net ton.

32405. **Sand, blast, core, engine, fire, foundry, glass, moulding, quartz, silex or silica,** in straight or mixed C. L., (See Note 2), from Cheswick, Pa., to Homestead, Pa., 90c per net ton. Present rate 99c per net ton. Reason: Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

32406. **Sand, blast, core, engine, fire, foundry, glass, moulding, quartz, silex or silica,** in straight or mixed C. L., (See Note 2), from Dunbar, Penn., to Arnold City, Brown, Landon, Rankin, Penn., $1.26 and Fallston, Penn., $1.64 per net ton. Reason: Proposed rates are comparable with rates to Monessen, Monongahela, Penn., etc.

32407. **Sand** (other than blast, core, engine, fire, foundry, glass, moulding, quartz, silex or silica), and **gravel,** in straight or mixed C. L., in open top equipment, (See Note 2), from Ambridge, Aspinwall, Bessemer, Brilliant, Coleman, Freedom, McKeesport, Mahoning, Natrona, New Kensington, Pittsburgh and Rochester, Penn., to destinations on the H. & B. T. M. R. R. Co., rates ranging from $1.50 to $1.80 per net ton. Also proposal to cancel present rate of $1.40 per net ton from Ambridge, Baden, Freedom and Rochester, Penn., to Mt. Dallas, Penn., via P. R. R. Destination station now abandoned, no freight delivery. Reason: Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

5179. **Sand,** C. L., Germanton, N. C., to Winston-Salem, N. C. (Cancellation.) It is proposed to cancel, on the obsolete theory, the present rates on aforementioned commodity from and to the points in question published in N. & W. Ry.'s Tariff G. F. No. 280. Class rates to apply after cancellation.

5192. (Rate suggested by carrier)—**Limestone,** ground or pulverized, C. L., Dugan, Ky., to Battle Creek, Mich. Present rate, 490c. Proposed rate on limestone, ground or pulverized, C. L., minimum weight 90,000 lb., from Dugan, Ky., to Battle Creek, Mich., 320c per net ton.

32420. **Broken limestone,** C. L., minimum weight 50,000 lbs., from Smiths Basin, N. Y., to Livermore Falls, Me., 19c per 100 lbs. Present rate, 28c per 100 lbs. Reason—Proposed rate is fairly comparable with rate from Swanton, Vt., to Livermore Falls.

32428. **Moulding sand,** C. L., (See Note 2), from Ushers, Elnora, Slingerlands, Delmar, Albany, West Waterford, Waterford, Mechanicville, Schenectady, South Schenectady, Round Lake, Saratoga Springs and Gansevoort, N. Y., to Springfield, Mass., 12½c per 100 lbs. Present rate—14½c per 100 lbs. Reason—Proposed rate is comparable with rates on like commodities from and to points in this same general territory.

32434. **Ground limestone,** C. L., minimum weight 50,000 lb., from West Rutland, Vt., to

(Erie R. R.)	Prop.
Gravity, Penn.	$2.80 N. T.
Thompson, Penn.	2.05 N. T.
Ararat, Penn.	2.05 N. T.
Uniondale, Penn.	2.20 N. T.
(N. Y. O. & W. Ry.)	
Preston Park, Penn.	2.05 N. T.
Forest City, Penn.	2.20 N. T.

Reason: Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

32436. **Limestone, ground,** C. L., minimum weight 50,000 lb., from West Rutland, Vt., to Lehigh, Hollisters, Moscow, Elmhurst, Dunmore, Olyphant, Priceburg, Pittston, Luzerne, Penn., $2.50; Green Ridge, Old Forge, Glenburn, Dalton, LaPlume, Factoryville, Penn., $2.35; Montrose, Penn., $2.20, being proposed rate per net ton. Reason: Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

32442. **Limestone, crude, furnace or fluxing,** C. L., minimum weight 50,000 lb., but not less than 40,000 lb., from Capon Road, Stephens City, Va., and Millville, W. Va., to Tyrone, Penn., $2.30 per gross ton. Present rate, 6th class. Reason—Proposed rate is fairly comparable with rates on pulverized limestone.

32443. To cancel from L. V. R. R. I. C. C. C-8610, local commodity rates on **crushed stone,** from Union Springs, P. & L. Junction, Suspension Bridge, Niagara Falls, Depew, Williamsville, North Tonawanda and Harriet, N. Y. Reason—Investigation develops that quarries at the above named points have been abandoned or discontinued operation.

32469. **Ground limestone,** C. L., minimum weight 50,000 lb., from Blakeslee, N. Y., to N. Y. C. R. R. stations, Sennett, Pittsford, Attica, Wilson, Ontario, Lowville, Alder Creek, N. Y., Westfield, Middlebury, Pa., and various, rates ranging from $1.25 to $2.50 per net ton. Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

Sup. 2 to 32078. **Limestone, ground or pulverized,** and **limestone dust,** C. L., minimum weight 50,000 lb., from Jordanville, N. Y., to D. & H. R. R., Erie R. R. and L. V. R. R. stations South Scranton, Carbondale, Penn., Horseheads, Savona, Atlanta, Freeville, Dryden, Van Etten Jct., N. Y. and various rates ranging from $1.80 to $2.20 per net ton.

32483. **Crushed stone, coated,** C. L. (See Note 2), from Jamesville, N. Y., to Roundout Station, Kingston, Ashokan, Arkville, Stamford, East Meredith, Oneonta, Edgewood, Hunter, N. Y., and various, rates ranging from $1.90 to $2.50 per net ton. Reason: Proposed rates are comparable with rates from South Bethlehem and Little Falls, N. Y.

32484. **Limestone, ground or pulverized,** and **limestone dust,** C. L., minimum weight 50,000 lb., from Jamesville, N. Y., to B. & O. R. R. & N. Y. C. R. R., stations Fords Brook, N. Y., Genesee, Newfield, Walton, Galeton, Beeman, Holiday, Wellsboro Jct., Ansonia, Penn., and various, rates ranging from $1.80 to $2.05 per net ton. Reason: Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

32493. **Sand, blast, engine, foundry, moulding, silica, quartz or silex,** C. L. (See Note 2), from Tullytown, Penn., to Elizabethport, N. J., $1.61 per net ton. Present rate $2.16 per net ton. Reason—Proposed rate is comparable with rates from Toms River, Mt. Holly and Millville, N. J.

32495. **Crushed stone** (will not include agricultural limestone or ground limestone, unburned; or fluxing stone or firestone) and **screenings,** C. L. (See Note 2).

To	From Steelton, Penn. Prop. rate	From Bluemont, Md. Prop. rate
Queponco, Md.	160	...
Snow Hill to Scarboro, Md.	160	...
Westover to Oil Siding, Md.	160	...
Costen to Lecato, Va.	160	...
Ocean City to St. Martins, Md.	160	160

The above rates in cents per 2,000 lb.

Reason—Proposed rates are comparable with rates on like commodities for like distances, services and conditions.

32509. **Sand (other than blast, core, engine, fire, foundry, glass, moulding, quartz, silex or silica),** and **gravel,** in straight or mixed C. L., in open top equipment (See Note 2), from Machias, N. Y., to Cambridge Springs, Penn., $1.40 per net ton. Present rate $1.60 per net ton. Reason: Proposed rate is comparable with rates on like commodities for like distances, services and conditions.

32511. To cancel from B. & O. R. R. I. C. C. No. 21299, local and joint commodity rates on:

Crushed stone, C. L. (See Note 2).

Sand (except blast, engine, foundry, glass, moulding and silica), and gravel, C. L. (See Note 2).

Sand, blast, engine, foundry, glass, moulding and silica, C. L. (See Note 2).

From Aggregates, W. Va., to destinations in West Virginia located on the Baltimore & Ohio and New York Central railroads as enumerated therein. Reason: Investigation develops no traffic has moved for some time and no prospect of future movement, therefore, rates are obsolete.

32513. **Broken stone,** C. L. (See Note 2), from Port Deposit, Md., to Allentown, Penn., $2.25 per net ton. Reason: Proposed rate is comparable with rates to Phillipsburg, Jersey City, N. J., and Easton, Penn.

32514. **Stone,** crushed, coated with tar, oil, asphaltum or similar bituminous materials, in bulk, in open top equipment in straight C. L. (See Note 2).

Note: The oil, tar and/or asphaltum not to exceed 10 per cent by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading. From Wertz, Penn., to Old Junction, Penn., $1.37 per net ton. Present rate 16c per 100 lb., sixth class. Reason: Proposed rate is comparable with rates from Martinsburg, W. Va., and Tyrone Forge, Penn.

Central

39765. To cancel all rates on **limestone, agricultural,** unburnt, in box cars, C. L., minimum weight 25 tons of 2,000 lb., from Ellwood Junction, Penn.; Hillsville, Penn.; New Castle, Penn.; Walford, Penn., and Wampum, Penn., to destinations in Ohio as shown on pages 15 and 16 of P. R. R. Tariff I. C. C. F-2080, account obsolete.

39767. To establish on **crushed stone,** C. L., from Marengo and Milltown, Ind., to C. & E. I. Ry. stations shown below. Rates in cents per net ton. Proposed, to Kinmundy, Brubaker, Salem, Cartier, Kell, Ill., 130; Bakerville, Ina, Benton, West Frankfort, Johnson City, Marion, Ill., 126. Present, class rates.

39768. To establish on **crushed stone,** C.L., from Marengo and Milltown, Ind., to I. C. R. R. stations shown below. Rates in cents per net ton. Proposed, to Robinson, Oblong, Willow Hill, Newton, Ill., 125; West Liberty, Olney, Calhoun, Parkersburg, Ill., 120; West Salem, Siegert, Grayville, Ill., 110; Edgewood, LaClede, Farina, Kinmundy, Alma, Odin, Central City, Ill., 130. Present, class rates.

39769. To establish on **crushed stone,** C. L., from Marengo and Milltown, Ind., to L. & N. R. R. stations shown below. Rates in cents per net ton. Proposed, to Ashley, Woodlawn, Belle Rive, Dahlgren, Ill., 130;

Note 1—Minimum weight marked capacity of car.

Note 2—Minimum weight 90% of marked capacity of car.

Note 3—Minimum weight 90% of marked capacity of car, except that when car is loaded to visible capacity the actual weight will apply.

McLeansboro, Ill., 126; Eldorado, Ill., 130; Shawneetown, Ill., 135; Enfield, Trumbull, Ill., 126; Carmi, Epworth, Maunie, Ill., 125. Present, combination rates.

39770. To establish on **agricultural limestone and agricultural limestone screenings,** in open top cars, C. L., to Tallmadge, O. Rates in cents per net ton.

From	Pres.	Prop.
Bloomville, O.	125	105
Maple Grove (Narlo), O.	125	105
Gibsonburg, O.	125	115
Woodville, O.	125	115

Route: Via P. R. R., Akron, O., Erie R. R.

39772. To establish on **sand,** blast, core, engine, fire, foundry, glass, moulding, quartz, silex or silica, in straight or mixed C. L., from Dunbar, Penn. (Rates in cents per net ton):

To		Proposed	Present
Arnold City, Penn.	*	126	200
Brown, Penn.	*	126	200
Fallston, Penn.	†	164	180
Landon, Penn.	*	126	200
Rankin, Penn.	†	126	135

*Delivering line—(1) P. & L. E. R. R., via P. R. R., Brownsville, Penn., P. & L. E. R. R.

†Delivering line—(2) P. & L. E. R. R., via P. R. R., Connellsville, Penn., P. & L. E. R. R.

39785. To establish on **sand,** except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding, or silica, and **gravel,** in open top cars, C. L., from Akron, O. (Rates in cents per net ton):

To (Rep. Pts.)	Proposed	Present
Apple Creek, O.	60	85
Bayard, O.	80	85
Bedford, O.	50	60
Bristolville, O.	85	90
Eagleville, O.	95	100
Garfield, O.	80	85
Kensington, O.	85	95
Limaville, O.	60	60
Malvern, O.	80	85
Minerva, O.	80	85
Moultrie, O.	80	85
Oakfield, O.	85	90
Rootstown, O.	60	60
Salineville, O.	90	95
Waynesburg, O.	85	85
Zoarville, O.	80	85

39786. To establish on **sand** (except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding and silica), and **gravel,** C. L., in open top cars, from Ashtabula, O. (Rates in cents per net ton):

To	Prop. Rates	Pres. Rates
Eagleville, O.	40	50
East Orwell, O.	50	60
Rock Creek, O.	40	50

Route—Via P. R. R. direct.

39846. To establish on **agricultural limestone,** unburned, in box cars, C. L., minimum weight, 50,000 lb., from Ridgeville, Ind. Rates in cents per net ton.

To	Pres.	Prop.
Anderson, Ind.	240	140
Chicago, Ill.	400	200
Chicago Heights, Ill.	400	200
Cincinnati, O.	300	150
Evansville, Ind.	460	230
Kokomo, Ind.	260	140
Indianapolis, Ind.	280	150
New Albany, Ind.	380	180
Louisville, Ky.	380	195
Rushville, Ind.	260	145
Seymour, Ind.	340	165
South Bend, Ind.	360	185
Elkhart, Ind.	340	185

39773. To establish on **sand** (other than blast, core, engine, fire, foundry, glass, moulding, quartz, silex or silica), and **gravel,** in straight or mixed C. L., in open top equipment, from Ambridge, Aspinwall, Bessemer, Brilliant, Coleman, Freedom, McKeesport, Mahoning, Natrona, New Kensington, Pittsburgh and Rochester, Penn., to destinations on the H. & B. T. M. R. R. & C. Co. (representative of which are shown in Exhibit B), rates as shown in Exhibit B. Present, as shown in Exhibit B. Route: Via P. R. R.–Huntington, Pa., or Mt. Dallas, Penn.–H. & B. T. M. R. R. & C. Co., as shown in Exhibit B. (b) To cancel present rates of $1.40 per net ton on **sand and gravel** as described above, from Ambridge, Baden, Freedom and Rochester, Penn., to Mt. Dallas, Penn., via P. R. R., account destination station now abandoned. No freight delivery.

EXHIBIT B

[Rates in cents per 2,000 lb.]
(Representative points.)

FROM AMBRIDGE, PENN.

To (H. & B. T. M. R. R. & C. Co.)	Prop.	‡Pres.
South Huntington, Penn.	*160	190
Hesston, Penn.	*170	200
Cove, Penn.	*170	210
Coalmont, Penn.	*170	250
Dulley, Penn.	*170	250
Clark, Penn.	*170	210
Defiance, Penn.	*170	230
Hopewell, Penn.	*170	200
Sandy Run, Penn.	*170	220
Brallier, Penn.	*170	200

FROM ASPINWALL, PENN.

To (H. & B. T. M. R. R. & C. Co.)	Prop.	Pres.
South Huntington, Penn.	*150	195
Hesston, Penn.	*160	195
Cove, Penn.	*160	195
Coalmont, Penn.	*170	195
Dulley, Penn.	*170	195
Clark, Penn.	*170	195
Defiance, Penn.	*170	195
Hopewell, Penn.	*170	195
Sandy Run, Penn.	*170	195
Brallier, Penn.	†160	190

FROM BESSEMER, PENN.

To (H. & B. T. M. R. R. & C. Co.)	Prop.	Pres.
South Huntington, Penn.	*150	195
Hesston, Penn.	*150	195
Cove, Penn.	*160	195
Coalmont, Penn.	*160	195
Dulley, Penn.	*160	195
Clark, Penn.	*160	195
Defiance, Penn.	*160	195
Hopewell, Penn.	*160	195
Sandy Run, Penn.	*160	195
Brallier, Penn.	*160	200

FROM BRILLIANT AND COLEMAN, PENN.

To (H. & B. T. M. R. R. & C. Co.)	Prop.	Pres.
South Huntington, Penn.	*150	195
Hesston, Penn.	*160	195
Cove, Penn.	*160	195
Coalmont, Penn.	*160	195
Dulley, Penn.	*170	195
Clark, Penn.	*160	195
Defiance, Penn.	*170	195
Hopewell, Penn.	*170	195
Sandy Run, Penn.	*170	195
Brallier, Penn.	†160	190

FROM FREEDOM, PENN.

To (H. & B. T. M. R. R. & C. Co.)	Prop.	Pres.
South Huntington, Penn.	*170	190
Hesston, Penn.	*170	200
Cove, Penn.	*170	210
Coalmont, Penn.	*180	250
Dulley, Penn.	*180	250
Clark, Penn.	*180	210
Defiance, Penn.	*180	230
Hopewell, Penn.	*180	200
Sandy Run, Penn.	*180	220
Brallier, Penn.	†170	200

FROM McKEESPORT, PENN.

To (H. & B. T. M. R. R. & C. Co.)	Prop.	Pres.
South Huntington, Penn.	*150	195
Hesston, Penn.	*160	195
Cove, Penn.	*160	195
Coalmont, Penn.	*160	195
Dulley, Penn.	*160	195
Clark, Penn.	*160	195
Defiance, Penn.	*170	195
Hopewell, Penn.	*160	195
Sandy Run, Penn.	*170	195
Brallier, Penn.	*160	180

FROM MAHONING, PENN.

To (H. & B. T. M. R. R. & C. Co.)	Prop.	Pres.
South Huntington, Penn.	*160	240
Hesston, Pa.	*160	240
Cove, Penn.	*170	240
Coalmont, Penn.	*170	260
Dulley, Penn.	*170	260
Clark, Penn.	*170	210
Defiance, Penn.	*170	230
Hopewell, Penn.	*170	200
Sandy Run, Penn.	*170	220
Brallier, Penn.	*170	200

FROM NATRONA, PENN.

To (H. & B. T. M. R. R. & C. Co.)	Prop.	Pres.
South Huntington, Penn.	*150	195
Hesston, Penn.	*150	195
Cove, Penn.	*160	195
Coalmont, Penn.	*160	195
Dulley, Penn.	*160	195
Clark, Penn.	*160	195
Defiance, Penn.	*160	195
Hopewell, Penn.	*160	195
Sandy Run, Penn.	*160	195
Brallier, Penn.	*160	190

*Via P. R. R.–Huntington, Penn.–H. & B. T. M. R. R. & C. Co.

†Via P. R. R.–Mt. Dallas, Penn.–H. & B. T. M. R. R. & C. Co.

‡Combination rates.

39771. To establish on (a) **sand,** except blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica, and gravel, in open top cars, and (b) **sand,** blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, moulding or silica, C. L., from Leetonia, O. (Rates in cents per net ton.)

To	Proposed (a)	Proposed ‡(b)	Present (a)	Present ‡(b)
Canton, Ohio	60	80	220	80
Cleveland, Ohio	90	100	280	100
Farrell, Penn.	80	113	240	240
Gerard, Ohio	60	70	200	70
*Hubbard, Ohio	80	90	220	90
†Lorain, Ohio	105	100	300	100
Lowellville, Ohio	70	80	220	80
Massillon, Ohio	85	90	240	90
Midland, Penn.	80	113	240	240
§Neville Island, Penn.	100	139	260	260
New Castle, Penn.	80	101	240	240
Niles, Ohio	50	70	200	70
Pittsburgh, Penn.	90	139	260	260
Sharon, Penn.	80	113	240	240
Sharpsville, Penn.	80	113	240	240
Steubenville, Ohio	100	110	280	110
Struthers, Ohio	70	80	220	80
Warren, Ohio	60	70	200	70
Wheatland, Penn.	80	113	240	240
Youngstown, Ohio	60	70	220	70

*Via P. R. R., Youngstown, O., and N. Y. C. R. R.

†Via P. R. R., Cleveland, O., and N. K. P. R. R.

§Via P. R. R., Duffs Junction, Penn., and P. C. & Y. Ry.

‡Rates to Ohio apply in open top cars.

Route—Via P. R. R. direct, except as shown above.

39910. To establish on **stone, crushed,** coated with oil, tar or asphaltum, C. L. (See Note 1 below), from Buffalo, N. Y., to Erie, Penn., rate of 113c per N. T. Present, 128c per N. T.

Note 1—The oil, tar and/or asphaltum not to exceed 10 per cent by weight of the commodity as shipped, the shipper to so certify on shipping orders and bills of lading.

39369. To establish on **crushed stone, crushed stone screenings and agricultural limestone,** in open top cars, C. L., to Vernon, O. Rates in cents per net ton. From McVittys, O., present, 260; proposed, 85; from Carey, O., present, 220; proposed, 80.

39962. To establish on **stone,** crushed; stone screenings, in open top cars, in bulk, C. L. Rates in cents per net ton.

TO PEYTONA, W. VA.

From	(*)	(†)	(‡)
Carey, O.	540	281	185
Marion, O.	520	244	175
Owens, O.	520	244	170

TO DANVILLE, W. VA.

From	(*)	(†)	(‡)
Carey, O.	500	281	185
Marion, O.	480	244	175
Owens, O.	480	244	175

TO MARMET, W. VA.

From	(*)	(†)	(‡)
Carey, O.	460	246	180
Marion, O.	440	209	170
Owens, O.	440	209	170

*Present rate, sixth class, Jones' I. C. C. No. 2445.

†Present rate, St. Albans combination commodity rates.

‡Proposed rate.

40070. To establish on **stone screenings** or **crushed stone,** in open top cars, C. L., the actual weight will apply, but not less than 72,000 lb. Proposed rates in cents per N. T. From Henlein, Penn.

To	Delivering line
Aliquippa, Penn.	P. & L. E. 100
Benwood, W. Va.	B. & O. 140
Benwood, W. Va.	P. R. R. 140
Bessemer, Penn.	B. & L. E. 100
Black Rock, N. Y.	Erie 130
Black Rock, N. Y.	N. Y. C. 130
Buffalo, N. Y.	Erie 130
Buffalo, N. Y.	N. Y. C. 130
Buffalo, N. Y.	N. Y. C. & St. L. 130
Clairton, Penn.	B. & L. E. 100
Economy, Penn.	P. R. R. 110
Homestead, Penn.	B. & L. E. 100
Lorain, Ohio	N. Y. C. 110
Lorain, Ohio	N. Y. C. & St. L. 110
Mingo Jct., Ohio	P. R. R. 130
Mingo Jct., Ohio	W. & L. E. 130
Munhall, Penn.	B. & L. E. 100
Pittsburgh, Penn.	P. & L. E. 100
Rankin, Penn.	B. & L. E. 100
South Duquesne, Penn.	B. & L. E. 100
Wheeling, W. Va.	B. & O. 140
Wheeling, W. Va.	P. R. R. 140
Wheeling, W. Va.	W. & L. E. 140

Present—Sixth class.

40071. To establish on **sand** (other than blast, core, engine, fire, foundry, glass, moulding, quartz, silez or silica), and **gravel,** in straight or mixed C. L., in open top equipment, from Machias, N. Y., to Cambridge Springs, Penn., rate of 140c per N. T. Route—Via P. R. R., Olean, N. Y., Erie R. R. Present—160c per N. T.

40073. To establish on **roofing granules** (silica), C. L., minimum weight 80,000 lb., from Copley, O., to Port Neches, Tex., rate of 680c per N. T. Present rate—724c per N. T. (360c, Copley, O., to St. Louis, Mo., Item 570; 364c, St. Louis, Mo., to Port Netches).

40078. To establish on **ground or pulverized limestone,** in bags or in bulk, in box cars, C. L., minimum weight 60,000 lb., from Bedford, Ind. (Rates in cents per net ton.)

To	Pres.	Prop.
Columbus, Ohio	230	170
Chicago, Ill.	190	175
Lancaster, Ohio	240	175
Streator, Ill.	189	175
Ottawa, Ill.	230	175
Newark, Ohio	240	180
Huntington, W. Va.	215	180
Mt. Vernon, Ohio	200	185
Utica, Ohio	200	185
Toledo, Ohio	200	185
Charleston, W. Va.	240	195
Owens, W. Va.	240	195
Wheeling, W. Va.	270	205

40100. To establish on **stone,** raw or crude, crushed, ground or pulverized (unburned), in box cars, C. L., minimum weight 60,000 lb., to Atlasburg and Studa, Penn., from Genoa, Martin and Marblehead, O., rate of 202c per N. T. Present—21c from Genoa and Martin, O. (6th class); from Marblehead, O., combination basis over Danbury, Ohio.

Illinois

7829. **Chatt, chatt dust or agricultural limestone,** C. L., from Bonne Terre, Flat River, Mo., and group to Chicago, Ill. Present—Class. Proposed—$2.05 net ton.

7837. **Crushed stone,** C. L., Joliet, Ill., to Highlands, Ill. Present—76c N. T. Proposed—60c, to expire Dec. 31, 1934.

7840. **Stone,** crushed, C. L., Chicago, Ill., to Cairo, Ill. Present, 19c 100 lb.; proposed, $1.52 net ton.

Southern

5055. (Rates suggested by carrier)—**Sand and gravel,** C. L., Jackson's Lake, Ala., to Montgomery, Ala. (intrastate). Present rate, 50c per net ton. Proposed rate on sand and gravel, C. L. (See Note 3), from and to aforementioned points, 33c per net ton (to expire September 30, 1934, unless sooner canceled, changed or extended.

5085. **Limestone,** ground or pulverized, C. L., Valmeyer, Ill., to Memphis, Tenn. Present rate, 36c per 100 lb. (8th class). Proposed rate on limestone, ground or pulverized, C. L. (See Note 3), from Valmeyer, Ill., to Memphis, Tenn., $1.80 per net ton.

5089. (Rate suggested by carrier)—**Limestone,** ground or pulverized, C. L., Danley, Tenn., to Jackson, Martin and Union City, Tenn. It is proposed to establish reduced rate on limestone, ground or pulverized, as shown in Description "A" of Item 15-B of Supplement D to Agent Speiden's Tennessee Limestone Tariff 248, from and to aforementioned points, 108c per net ton.

4892. **Stone,** viz., limestone or marble, ground or pulverized, C. L., Cartersville, Ga., to Hamilton, Ohio. Present rate, $3.63 (Dayton, Ohio, rate). Proposed rate on stone, viz., limestone or marble, ground or pulverized, C. L., as described in Item 8117 of Agent Speiden's I. C. C. 1731, from Cartersville, Ga., to Hamilton, Ohio, $3.51 per net ton.

4971. **Stone,** crushed, C. L., Dombey, Ky., to Fort Knox, Ky. Present rate, 95c. Proposed rate on crushed stone, C. L., minimum weight (See Note 3), from Dombey to Fort Knox, Ky., 70c per net ton.

5253. **Stone,** viz., limestone or marble, ground or pulverized, C. L., Tate and Whitestone, Ga., to Hamilton, O. Present rate, $3.63 per net ton. Proposed rate on stone, viz., limestone or marble, ground or pulverized, C. L., as described in Item 8117 of Agent Speiden's I. C. C. 1731, from and to aforementioned points, $3.51 per net ton. Same as proposed under Submittal 4892 from Cartersville, Ga.

Southwestern

3403. **Chatt, chat dust or agricultural limestone,** from Bonne Terre, Flat River, Mo., and group to Chicago, Ill. To establish a rate of $2.05 per ton of 2,000 lb. on chat, chat dust or agricultural limestone, C. L., minimum weight, 40,000 lb., from Bonne Terre, Flat River, Mo., and group, to Chicago, Ill.

3409. **Talc, waste, crude, crushed, ground, powdered or pulverized,** from New Orleans, La., to Port Arthur, Tex. To establish a specific commodity rate of 16c per 100 lb. to meet the competition of the large lines, whose rate is 15c per 100 lb. The present all-rail rate is 27c.

3507. **Sand and gravel,** from Oklahoma points, also Van Buren, Ark., to Fayetteville, Ark. To establish rate of 65c per ton from Van Buren, Ark., and 75c per ton of 2,000 lb. from Ft. Gibson, Keough, Kreiner and Leake, Okla., to Fayetteville, Ark., on sand and gravel, C. L. (See Note 3).

Texas-Louisiana

8177-6-TX. **Sand,** C. L., rate from Sutherland Springs, Tex., to San Antonio and Randolph Field, Tex.: Proposition from shippers to establish rate of 45c per net ton on sand, C. L., minimum weight marked capacity of car loaded to full space capacity is less than the marked capacity, such actual weight shall be used, from Sutherland Springs, Tex., to San Antonio and Randolph Field, Tex. To expire concurrently with rates in Item 7844-C, Sup. KK, of Tariff 2-L. Rate to be subject to a note providing that the rate to San Antonio to be subject to the provisions of Note 1, Item 7844-C, Sup. KK, Tariff 2-L (non-absorption of switching charges).

A new sand pit has just been opened at Sutherland Springs, Tex., a local point on Southern Pacific, distance 32.2 miles southeast of San Antonio, the operators of the pit have requested publication of the same reduction under standard rates as now applicable from a cross-country pit at Saspamco with which pit they must compete.

8691-4-TX. **Sand and gravel,** C. L., from F. W. & D. C. stations, Ady, Tascosa, Magenta, Berger and Murdo, to F. W. & D. C. stations, Channing to Corlena, Tex.: Proposition to establish rate of 55c per net ton on sand and gravel, minimum 90% of marked capacity except when weight of car loaded to capacity is less, from and to points on F. W. & D. C. as shown above. Proposed rates to permit rail shippers to compete with roadside pit production which will move via truck, thereby enabling rail carriers to participate in this traffic.

9193-2-TX. **Sand and gravel,** C. L., from Carley and Glass to College Station, Tex.: Proposition from carriers to establish rate of 45c per ton of 2000 lb. on sand and gravel, C. L. (See Note 3), from Carley and Glass to College Station, Tex. The proposed rate is necessary in order to meet wayside pit competition.

Lower Rock Rate Asked

THE Missouri and North Arkansas Railway Co. has applied to state authorities to put into effect a rate of 50 cents a ton for crushed rock from Red River, Ark., to West Helena. At a hearing May 29, the company recommended the proposed rate on the basis of motor truck and river transportation in connection with highway paving projects between Helena and West Helena.

At the same time a protest against the proposed lowered rate was filed by the Missouri Pacific Railroad.

Supreme Court Upholds Switching Rates

EFFORT of Illinois and Indiana interests to set aside the Chicago switching rates order of the Interstate Commerce Commission failed May 28 when the United States Supreme Court, on appeal from the Federal court for the northern district of Illinois, affirmed the dismissal by the lower court of the complaint upon which appellants sought to set the order aside.

Appellants contended that the order could not be applied to certain carriers whose rails extend only into the Illinois section of the Chicago district.

State Wins in Sand-Gravel Rate Appeal

REVERSING the recommendation of its Division No. 5, the Interstate Commerce Commission has sustained the Virginia State Corporation Commission in its action against the Tennessee Sand and Gravel Co.

The case involved freight rates on sand and gravel from Petersburg, Va., to points along the Norfolk and Western Railway. The Tennessee company maintained that the shipments made largely in returned coal cars bore too low a rate in competition with shipments to Tennessee. Substantial shipments of sand and gravel are made from Petersburg to points in southwest Virginia, chiefly for highway building construction and to coal mines where fine aggregate is used for laying dust.

Code Progress—Developments

Cement: Exemption requested from Article 10, Section 4, Subsection K and Article 13, Section 3, to apply only to bids by members of the industry for cement for Fort Peck tunnels, State of Montana. The first subsection refers to prohibition on furnishing facilities, articles, etc., to purchasers; the second to prohibition on absorption of charges for inspection tests.

Crushed Stone, Sand and Gravel, and Slag: Regional adjustment agencies approved for Regions Nos. 8, 9, 15 and 16.

In Region No. 8 (the state of Ohio), the agency is composed of Chairman Russell Rarey, the Marble Cliff Quarries Co., Columbus; William Edward Hole, American Aggregates Corp., Greenville; W. E. Bliss, the Standard Slag Co., Youngstown; H. M. Sharp, the France Stone Co., Toledo; Stephen Stepanian, the Arrow Sand and Gravel Co., Columbus; R. G. Spencer, the National Lime and Stone Co., Findlay; Earl Zimmerman, Ohio Gravel Co., Cincinnati; E. L. Flad, Carnegie Steel Co., Pittsburgh, Pa., and Fred Hubbard, Canton Slag Co., Youngstown.

In Region No. 9 (Illinois and Indiana), the members are: Chairman, W. R. Sanborn, president, Lehigh Stone Co., Kankakee, Ill.; R. E. Weaver, vice-president and general manager, Lincoln Sand and Gravel Co., Lincoln, Ill.; George W. Renwick, vice-president and sales manager, Chicago Gravel Co., Chicago, Ill.; N. E. Kelb, secretary, treasurer and general manager, Erie Stone Co., Indianapolis, Ind.; W. H. Sanders, sales manager, Western Indiana Gravel Co., Lafayette, Ind.; L. E. McDermut, president, Illinois Slag & Ballast Co., Chicago, Ill.; J. J. O'Laughlin, manager, stone and gravel sales, Consumers Co., Chicago, Ill.; T. E. McGrath, vice-president McGrath Sand and Gravel Co., Lincoln, Ill., and N. D. Connelly, owner, Slag Operation, Chicago, Ill.

In Region No. 15 (California and Nevada): Neal O. Baker, Triangle Rock Co., San Bernardino, Calif.; Frank Gautier, Los Angeles, Calif.; A. J. Wilson, Granite Rock Co., Watsonville, Calif.; Anson S. Blake, San Francisco, Calif.; F. W. Erlin, California Rock and Gravel Co., San Francisco, Calif.; P. C. Graham, Graham Bros., Inc., Long Beach, Calif., and C. M. Cadman, Pacific Coast Aggregates, Inc., San Francisco, Calif.

In Region No. 16 (Montana, Washington, Oregon and Idaho): Porter W. Yett, Portland, Ore.; George W. Gauntlett, Seattle, Wash.; John R. Reese, Portland, Ore.; Marshall Newport, Portland, Ore., and Howard F. Puariea, Portland, Ore.

Uniform terms of sale and uniform credit practices have been approved for Districts Nos. 1, 2, 4 and 5 in Missouri, and Districts Nos. 1 and 2 in Kansas, Region No. 13.

Ready-Mixed Concrete: Budget of $23,000 per annum submitted to NRA for approval. From 110 questionnaires returned by members of the industry, an annual production of 2,500,000 cu. yd. of concrete was indicated for the year 1932. These companies represented most of the larger companies and the yardage is, therefore, a major percentage of the total national production. As it was recognized that there might be considerable delay in distributing information regarding the Code and in obtaining compliances thereto, it was therefore believed to be equitable to estimate that a reported volume of about 1,500,000 cu. yd. would be available on which to make assessments for the current year. To provide the estimated funds of $23,000, on the basis of the volume, an assessment of 1½c per cu. yd. per annum would be required.

Concrete Pipe: Budget of $12,000 per annum submitted for approval.

Concrete Masonry: Budget of $63,100 per annum submitted for approval: Would require 1¾% assessment on current sales volume in 1934, with a minimum assessment of $10 for each member of the industry.

Sand-Lime Brick: Code Authority as elected by the industry (Rock Products, May, 1934, p. 63) approved by NRA.

Slate: Membership of regional and district committees approved.

Recent Prices Bid and Contracts Awarded

Alpena, Mich.: City council entered into a contract with the Huron Portland Cement Co. for purchase of 5,500 bbl. of cement at $2.30 per bbl., less 40c for returned sacks and 10c for cash discount. The cement is to be used in constructing a pavement on North Second avenue, East Heuber street and Ford avenue to the cement plant.

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Portland, Ore: A bid of $1.90 per bbl. for Norwegian cement, and eight identical bids of $2.02 for domestic portland cement were received by the United States army engineers at Portland, when proposals were received for supplies for the power-navigation dam at Bonneville on the Columbia river. The bids will be referred to Washington, D. C., for action. Other bidders included Beaver Portland Cement Co., Gold Hill; Oregon Portland Cement Co., Oswego; Oregon Portland Cement Co., Lime, Ore, and five California companies.

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Stoneham, Mass.: Public works department received bids on pea stone, General Crushed Stone Co., $1.71 per ton (2% off cash in 10 days); Rowe Contracting Co., $1.10; stone dust, General Crushed Stone Co., $1.11; Rowe Contracting Co., $1.15; pea gravel, Concrete Material Co., $1.40 (two grades); William C. Doherty, Inc., $1.60 and $1.40 (two grades).

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Somerville, N. J.: County board of freeholders received five bids for crushed stone. Local newspaper reports: Code prices made all bids for stone alike and the prices were: $1.60 per ton for dustless screenings; $1.50 for 1½-in. and 2½-in. and $1 for road stone. Corresponding prices paid last year were $1.15, $1.15 and 60c. The bids will be submitted to the State Highway Commission for approval and as all bids are alike the patronage is likely to be distributed according to the location of the quarries in relation to the shortest haul for delivery on the roads. The bidders were: Morris County Crushed Stone Co., Morristown; Hoffman Construction Co., Bernardsville; Somerset Trap Rock Co., Watchung; Kingston Trap Rock Co., Kingston; Bound Brook Crushed Stone Co., Bound Brook.

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Omaha, Neb.: County commissioners voted to purchase approximately 80,000 tons of gravel for either new graveling or for maintenance of present county roads. The gravel will average 70c a ton with a 45c freight charge. Most roads to be regraveled are in the western and northern parts of the county. They are made up of short stretches from a quarter mile to two miles long.

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Detroit, Mich.: Charges that vendors have taken advantage of minimum price provisions of NRA codes by "kiting" prices submitted on bids for city purchases will be made to Common Council by John J. Gorman, city purchasing agent. The Aetna, Peerless, Petoskey and Huron Portland Cement companies bid $2.25 per bbl. on the city's cement supply. The contract was divided four ways. A year ago the price was $1.87. "We are merely following regulations set up in the NRA code," an official of the Aetna Portland Cement Co. said. "The government has established a statistical code allowing a certain mark-up above a basic cost figure. We have to file our prices with NRA officials monthly. The city of Detroit receives the same cement quotations as every other governmental body. And I believe this holds true with all materials manufactured under code regulations."

Lyndon, Ill.: Maxfield & Carlton, Lyndon and Rock Falls, have been awarded the contract to furnish 2,000 cu. yd. of river gravel for road work in Union Grove township. Bid was 98c per cu. yd., other bids being $1.12 and $1.17, respectively. This bid is considerably less than the amount for which gravel was furnished last year. The low bidder is required to deliver the material to the road jobs. The conditions of the contract state that the material must not exceed 1¼ in. in size and must not contain more than 20% sand.

Cement

National Portland Cement Co., Bath, Penn., will complete its new plant by November 1, according to local newspapers, in spite of many obstacles placed in the way by its future competitors. Connie Mack, manager of the Philadelphia Athletics baseball team, and John D. Shibe, his associate, are important financial backers. There are other baseball magnates behind it. The officers of the cement company are: President, Wm. M. Richardson, president Philadelphia Export Co., Philadelphia; vice-president and treasurer, Washington American League baseball team; vice-president and general manager, Fred Franks, Allentown; assistant vice-president and assistant general manager, Hugh J. Larkin, Bethlehem; treasurer, John D. Shibe, vice-president American League baseball club of Philadelphia; secretary-treasurer Philadelphia Export Co.; secretary, Geo. M. Richardson, general manager and treasurer, Merchants' Warehouse Co., Philadelphia; general manager and treasurer, Philadelphia Tidewater Terminal, of Philadelphia; treasurer Scott Bros., Inc., Philadelphia.

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Universal Atlas Cement Co., Chicago, Ill.: Appointment of C. A. Webb as sales manager is announced by F. L. Stone, vice-president and general sales manager of the company. He will have charge of the Chicago metropolitan territory. The remainder of Illinois, and Indiana, lower Michigan and southern Wisconsin remain in charge of Edward Quebbeman, sales manager. Mr. Webb has been connected with the Universal Atlas company for 17 years, including a leave of absence at the time of the World War, when he served in France as an officer in the American army. He formerly was district sales manager for the company. He is a graduate in civil engineering of Arkansas University and a post-graduate in highway engineering of Columbia University. He is a member of the Chicago Engineers' club, Western Society of Engineers, American Society of Civil Engineers, Society of American Military Engineers, Builders' club, Tau Beta Pi, honorary engineering fraternity, and Sigma Chi. Mr. Webb is active in the Chicago Association of Commerce, being member of its street traffic committee and fellowship forum.

Lime Producers' Forum

Conducted by Victor J. Azbe,
Consulting Engineer, St. Louis, Mo.

WHILE LIME MANUFACTURE is very simple in its elementary form actually the technic is most complex, so complex that the subject never has been covered adequately in print nor was there an individual who really thoroughly understood the matter in most of its phases.

Much has appeared in print, it is true, and the writer has written as much on the subject as anyone, so it should not appear presumptuous if he states that the subject is still far from having been established on the sound foundation of most other chemical engineering endeavors.

As illustration it may be stated that the general assumed reaction in a kiln is $Ca\ CO_3 = Ca\ O + CO_2$, but actually this, while the most important, is only one of fifty known and a hundred likely reactions that take place, of which at least half have some important bearing on quality, capacity, or efficiency.

The writer studied lime manufacture quite intensively and geographically extensively. Not only in America, but in most countries of Europe. He tested kilns into the hundreds, overhauled old, built new kilns, gathered information in largest as well as in smallest of plants, in some of the most efficient and some of the least efficient in plants, that were money makers, and others that were money losers, he learned much, but far from all.

But during the many years he acquired one very important item, which was a systematized knowledge of what he did not know, simultaneously he became acquainted with other men in the industry who had this lack of knowledge, who had experience along special lines, along lines that would be very helpful to other manufacturers if the information could somehow be switched over to them, but the switch was lacking. While through the National Lime Association there was a liberal exchange of ideas on matters of business, for matters of manufacturing interest the industry has been without a Technical Forum, where sound practices could be promoted, notable experiences exchanged and to which a manufacturer could appeal for possible solution of some vexing problem.

It was with this in mind that the editor of Rock Products arrived at the decision to devote monthly a page or two to such a "Lime Forum," which the writer was asked to conduct and edit in a manner to be beneficial to the industry as a whole. As the ancient Forum Romanum was built of limestone and lime for purposes of political discussion, in this case of ours the subjects of discussion will be lime and limestone on the modern platform of a substantial technical publication.

The intention is to have the whole studiously unbiased and to plan that topics will be divided into more practical and others more technical. There will be such as the industry may express a desire for, and others such as the editor may think will be of value to the industry. Most of the items will be short, but the customary long articles will be published in the regular sections of the journal as heretofore. If a demand is indicated for a question and answer column, this will be a part. If items are received in confidence such confidence will never be violated in print or otherwise. If poor performance of any plant is discussed, this will be without publishing of name, and so disguised that identification will be impossible. If good points of any plant are the topics the name and full credit always will be given except undesired.

The field of action is so extensive and the space available so small, that beginning is most difficult. There are so many possibilities for discussion, many new, as the burning of spalls in vertical kilns, control of lime color, the building of center burners within kiln shafts, latest designs for heretofore undreamed capacity, kiln linings whose life is measured by years rather than months, sound application of now so generously distributed natural gas, and other items running to an endless number.

Editor's Introduction

WITH this issue we introduce a new feature especially for the lime producer, his superintendent and foremen.

We do not need to introduce the "column conductor" for Mr. Azbe is well-known in the lime industry.

Questions on lime plant operating problems will be welcome. Those who propose them need not have their names published, but of course the editor must know who they are to be sure the questions are bona fide.

—The Editor.

Lime plant of National Carbide Co. Kiln "C" recently was taken off the line for repairs after a continuous run of 26 months

Record Established for Kiln Run

Kiln C, a vertical producer gas-fired lime kiln, one of three in operation at the plant of National Carbide Co. in Virginia, recently established what probably is a record for kilns of gas-fired type. It was taken off the line for repairs after having been in continuous service for a period of *twenty-six months*, producing during this one run around *thirty thousand tons of lime*. Such long runs are common only to mixed-feed kilns, not to gas-fired kilns, and particularly not in plants where, as in this case, the desire is for hard burned lime on account of its subsequent use in electric furnaces. Also the rock was of a nature producing high draft resistance in the kiln. Yet in the neighborhood of 45 tons of lime were produced per day from a shaft of 57 sq. ft. area, which is not a large shaft considering the capacity obtained. To accomplish this, the draft at kiln top was close to 5 in. water gauge. Which all proves that one can force kilns without shortening life.

The contrasts are somewhat startling, a run some four times greater than what is common, and a capacity rate for kiln size twice the ordinary. An output of 30,000 tons compared to a commonly obtained output of maybe 5,000 tons.

From Rock Products' Readers

Removing Silica Block Tube-Mill Linings

THE EDITOR: When the lining of our tube mill has to be replaced, removing the old blocks becomes a tedious and expensive piece of work.

We use Jasper silica lining blocks, which come from Jasper, Wyo. A sand-cement mortar is used for cementing the blocks in place.

The tube mill is steel.

Our object in writing you is to inquire if you know of any method whereby these blocks could be removed easier and cheaper. When we have to reline the tube mill, we remove all the blocks.

It occurred to us that something could be used that would disintegrate the cement mortar and at the same time have no effect on the steel and the blocks that are not worn. Have you any information on anything of this sort?

Any suggestions, recommendations or ideas you think that would be helpful would be appreciated. No doubt your experience with problems of this nature will enable you to either give us some worthwhile suggestions or refer us to someone who can help us.

"MID-WEST GRINDER."

* * *

Readers' Help Wanted

The editor had to answer that one by promising to submit the problem to his readers, some one of whom undoubtedly has the same problem, and may have found the solution. Suggestions are solicited.

* * *

Likes Our Editorials

THE EDITOR: Have just read your two editorials in your June issue of ROCK PRODUCTS, one on the front page and the one entitled "Editorial Comments." They are both well timed and to the point.

Wish to heaven we could get this idea over to every producer and every consumer, too.

THOS. MCCROSKEY.

Knoxville, Tenn.,
June 6, 1934.

Silicosis Racketeering in Missouri

THE EDITOR: Have read "Cement Plants Fight Silicosis Racket," in your May issue. This is the best exposition I have yet seen in print of what is actually going on. The article gets right down to cases.

Everything therein concerning Missouri conditions is correct, and the writer could have gone still farther in the matter, had he so wished.

The latest victim in this state is the fireclay industry at Mexico, Audrain County. Harbison Walker Refractories are being sued for $25,000. As usual the "runner" or hobo attorney picked out the one with the most money. If the "plaintiff" has worked for several companies, as is sometimes the case, the snitch lawyer picks out the company most likely to come through with the money.

We have seven of these, with a mill that has been dustless for years; we got a hung jury on the first and most pitiful case (permanently crippled by syphilitic arthritis, no silicosis). Six of the remaining cases then pulled out voluntarily to the great disgust of the snitches. The other two will probably not come to trial.

As the chemist for one of the principal offenders in St. Louis remarked: "To hell with the chemical analysis, all we need is dust." Any dust will do.

Missouri is one state that industry had better keep out of, for we have no legal protection whatever from these racketeers.

"A MISSOURI VICTIM."

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Causes of Air-Receiver Explosions

THE EDITOR: In my letter, "Causes of Air Receiver Explosions," in the June number of ROCK PRODUCTS, p. 53, is an error that occurred when typing from my rough draft. The 1,000 in the sentence, "The required capacity of the trap would be less than a gallon of water per 1,000 cu. ft. of free air compressed," should be 10,000. I noticed this when reading the article, and wondered whether I should trouble you with a correction of what would be an obvious error to those familiar with compressed-air practice. A letter today from a friend in a cement plant in the Middle West, in which he facetiously remarks that he intends blowing off his receiver to the reservoir to conserve the large amount of water that I say is in the air, causes me to write this. If you will make a correction note, I promise to be more careful in the future.

The amount of moisture deposited in a receiver depends on the temperature and humidity of the atmosphere, the ratio of compression, and the effectiveness of the receiver as a means of heat transfer. With high temperature and humidity, a high ratio of compression and a large receiver, the amount of water deposited is a maximum. For example: With air at 80 deg. F. and 100% humidity; single-stage compression to 80 lb. gauge and subsequent cooling to 80 deg. F., the amount of water deposited would be about 1.5 gal. per 10,000 cu. ft. of free air. But with air at 80 deg. F. and 70% humidity, and subsequent cooling to 100 deg. F., the water deposited is about 6.5 lb. per 10,000 cu. ft. of free air—less than a gallon. This is what I had in mind during the discussion. In some receiver installations, small ones, the time element may be so small that very little cooling takes place, and the water deposited may be a fraction of that indicated above.

C. O. SANDSTROM.

Los Angeles, Calif.,
June 12, 1934.

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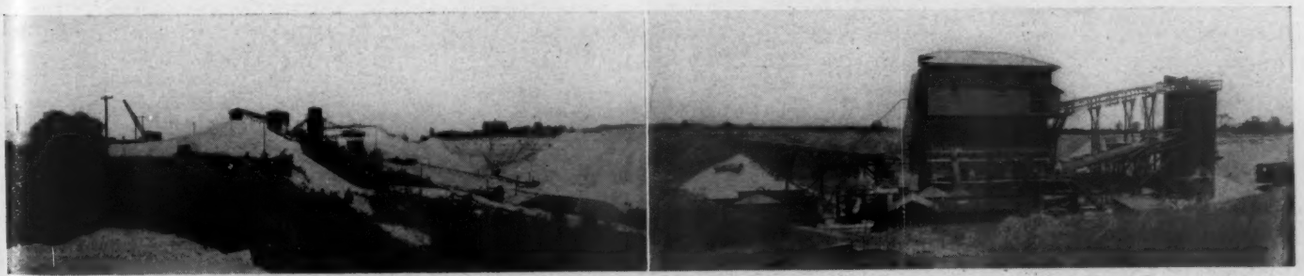
Large Ballast Order

BY THE last of June, the Janesville Sand and Gravel Co., Janesville, Wis., had shipped more than half of its recently received 1000-carload order for mixed sand and gravel.

From 18 to 27 cars a day have been shipped from the company's No. 3 and No. 4 plants. The ballast, ordered by the Chicago and Northwestern Railway, is being



Left: Plant No. 4 of the Janesville Sand and Gravel Co., Janesville, Wis. Right: Plant No. 3, source for a great part of the company's 1,000-car ballast order.

used in its track relaying program from Oregon north to Elroy, Wis. Because the deposit surrounding Plant No. 3 (see illustration) runs over 50% gravel, much of the material is being loaded there. Plant No. 4, adjoining the company's main office, also is a source for the ballast shipments.

The total order, calling for approximately 50,000 tons, is used at the rate of about 18 carloads per track mile. Shipments from southern Wisconsin pits have been at a substantial level this summer. Between 175 and 200 carloads a week have been billed out of plants in and around Janesville. Heavy shipments also have been made from Beloit.

"Improvement in sand and gravel business has been noted recently," says G. F. Ehrlinger, secretary-treasurer of the Janesville Sand and Gravel Co., "largely because of PWA loans for railway and highway construction. The run of orders from farmers, however, is poor because of the depressed farm situation."

The 1933 Sand and Gravel Trophy Winners

THE 1933 WINNERS of the national safety contest conducted annually by the U. S. Bureau of Mines in coöperation with the National Sand and Gravel Association are plants of two well-known companies—the Van Sciver plant of the Warner Co., near Philadelphia, Penn., and the Missouri River plant of the Stewart Sand and Material Co., Kansas City, Mo.

Both these operations have had three years of no-accident records—the Warner Co. plant three successive years, 1931, 1932, 1933; and the Stewart Sand and Material Co. plant 1930, 1932 and 1933. In view of these remarkably fine records Rock Products has provided a special trophy, gold with a silver seal, with the National Safety Council emblem in green and white.

The contest was started in 1929 with 26 plant entries. Interest has grown steadily and each year more entries were made, resulting in the accumulation of much valuable data in regard to accident frequency, hazards, etc., in connection with sand and gravel plant operation. Such information was entirely lacking prior to 1929 and insurance rates reflected this absence of specific information by being higher in most instances than the hazards justified.

Crushed Stone

West Virginia: A new FERA enterprise in West Virginia just announced by E. Wayne Coffindaffer, state rehabilitation director, is the cooperative operation of a series of lime quarries in the central area for the distribution of crushed limestone among sections needing it for growing grasses suitable for the fattening of live stock. Farmers needing the limestone are to be allowed to work in the quarries for payment in quantities of the product equivalent to their wages. Other FERA labor also will be employed. The cooperative quarry scheme is expected to distribute the product at around $1. That not needed by participating farmers will be sold to others at that rate.

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Linwood Cement Co., Davenport, Ia.: G. D. Shawver has been named receiver in a mortgage foreclosure action brought by the Liquidation Corp., to satisfy claims of approximately $102,000. Trial of the foreclosure petition will be continued to March 1, 1935.

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France Stone Co., Whitehouse, Ohio, plant: Some 60 men were laid off when the FERA project closed down at the Waterville quarry to allow the France Stone Co. to resume private operation of the plant for the production of stone for nine miles of new road along the river above Texas. The France company recalled its old men, some 20 in number.

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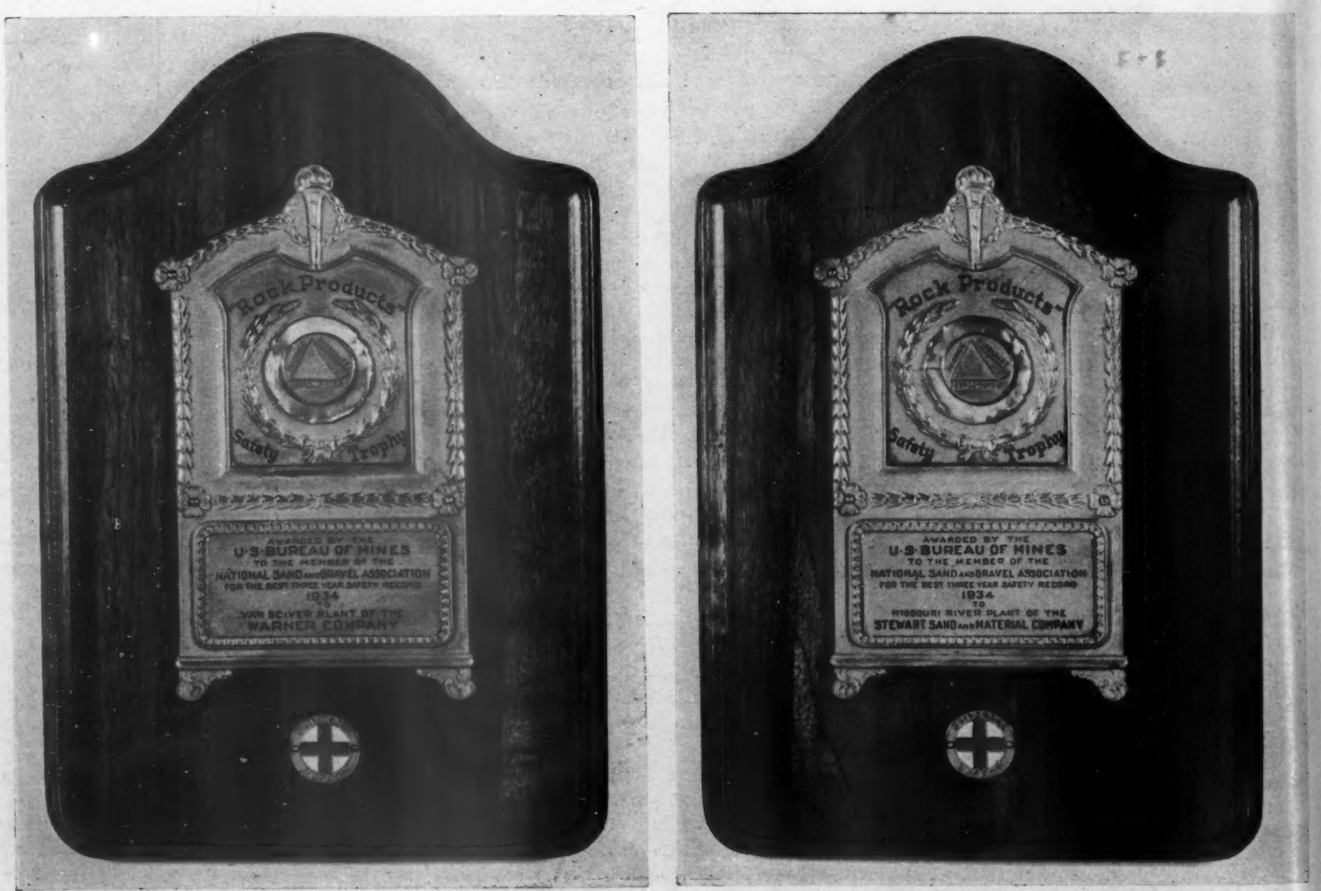
Olentangy Stone Co., Delaware, Ohio, has been purchased and is being operated by the Kuenzli Quarries Co., Inc., Upper Sandusky. New owners have been engaged in the quarry business for a number of years.



Trophy plaques awarded Pennsylvania and Missouri sand and gravel plants for safety records

Cement Products

Mississippi Revetments with Tetrahedrons

ON November 7, 1933, the United States District Engineer at Vicksburg received bids on the manufacture of 6,780,000 concrete tetrahedrons* to be used in revetting the slopes of the Mississippi River south of Memphis, Tenn. Specifications required that "the contractor shall employ sufficient crew and equipment to cast and load on barges at least 50,000 tetrahedrons each calendar day.

"The contractor shall commence delivery of the concrete tetrahedrons on government barges within 21 calendar days after date of receipt of notice to proceed and thereafter the delivery rate will be at least 50,000 blocks per day until completion of contract. In case of the failure on the part of the contractor to load the blocks at the rate specified, after barges have been delivered to him, he shall pay to the United States as liquidated damages the sum of $100 for each lot of 10,000 blocks he fails to load on any one calendar day."

Provision was made in the specifications for use of either ordinary portland cement or high early strength portland cement. Should the former be used a mixture to produce concrete having a strength of 2,000 pounds at seven days was required. Using the latter, a concrete which would develop 2,000 lbs. compressive strength at time of delivery was specified.

Simons-Mayrant Co., Charleston, S. C., submitted a low of $.0789 per block unit delivered on government barges at Greenville, Miss. Contract was awarded November 22. A set of forms was designed so as to permit the use of paving mixers in mixing and placing the concrete, and highway construction methods in puddling and finishing the units.

The contractor is manufacturing at the present time 62,500 blocks daily, using 50,000 forms, one-fourth of which are filled twice daily.

From the beginning of the revetment-unit contract the contractor has been using "Incor" high early strength cement in order to permit two fillings per day and to make possible delivery of the tetrahedrons to government barges within 48 hours or less. Average 48-hour strength of 81 cylinders made from "Incor" cement concrete used on this job is 3,166 pounds per square inch.

*A tetrahedron is a four sided solid, each side of which is an equalateral triangle. The advantage of this shape solid is that a tetrahedron has the lowest center of gravity of any known solid, and therefore has the greatest resistance to overturning. These units are dropped into the river. Due to their shape, they come to rest on a base regardless of which side falls down.

This government unit is approximately 12 in. high, containing about one-fifth cubic foot of concrete and weighing from 27 to 32 lb.,

Concrete tetrahedron units ready for loading into barge-bound trucks

Home Modernization First Aim of Housing Act

UNDER PROVISIONS of the National Housing Act, passed by congress before its June adjournment, the government is making another attempt to loosen credit for home construction and modernization. Cement products manufacturers are formulating plans to tie in their advertising efforts with those of the government. A substantial increase in the use of cement and aggregates is looked for as a result of this and similar co-operative activity.

The first section of the act provides specifically for modernization loans, and it is on this phase that initial efforts of the government and enlisted agencies are concentrating. Apparently, the administration's belief is that this new law, while holding the government treasury's commitment to a minimum, will take up the slack left by the Home Owners' Loan Corp.

As a result of the "Modernize Now" campaign being planned in Washington, it is hoped that several million small renovizing projects will take form in the 1934-35 period. If an average of $500 per project is counted on, 2,000,000 property owners will have to sign on the dotted line to fulfill hopes of the act's sponsor's that $1,000,000,000 will be the total modernization thus stimulated. More than half the actual total will be spent, it is assumed, for labor. Possibly 25% of the balance may represent the purchase of aggregates or cement products used in modernization work. In any event the treasury's actual commitment, so far as the modernization phase goes, will not exceed $200,000,000—20 per cent of the billion dollars' worth of renovizing the act is expected to stimulate. A billion dollars' worth of new construction, and another billion of mortgage refinancing are counted upon by the administration as ultimate results of the legislation.

Modernizing Plus

Provisions for modernization represent only one of five major features of the act. A federal guarantee of 20% of the principal for modernizing loans on all types of property is given. The primary emphasis, however, is on homes, and renovizing loans are limited to $2,000 each. The 10,000-word act, parts of which were personally revised to final form, it is said, by President Roosevelt, allows for:

(1) Appointment of a Federal Housing Administrator at a yearly salary of $10,000.

(2) Government insurance of home mortgages up to $16,000 in principal amount and not to exceed 80% of appraised value of property; loans on newly constructed houses up to 80% of appraised value—of new mortgages on existing homes, up to 60% of appraised value.

(3) Private organization, under federal supervision, of mortgage associations, to attract outside capital to areas in which local savings are insufficient to meet requirements of home financing.

(4) Insurance of investors' accounts in building and loan associations.

(5) Increase in capitalization of Home Owners' Loan Corp. to $3,000,000,000, with 10% of total ear-marked for modernizing and repair loans on properties financed by the corporation.

Zonolite Company Sold to Eastern Business Men

W. B. Mayo, Former Chief Engineer, Ford Motor Co., Heads New Owners of Unique Rock Product

ACCORDING to local newspapers E. N. Alley, who has devoted the last several years to developing and promoting "Zonolite," the trade name of a Montana vermiculite, has confirmed the report that control of the company he founded has passed to Eastern capitalists. W. B. Mayo, Detroit, Mich., former chief engineer, Ford Motor Co., heads the group. The *Libby* (Mont.) *Western News* reports an interview with Mr. Alley:

The Detroit men are chiefly interested in the marketing of several products in the perfecting of which they have spent large sums of money and which are composed chiefly of Zonolite. These products have been perfected to a high degree and are of such a nature that it is believed a huge demand will be developed for them. The eastern men have long been engaged in big business enterprises and are feeling their way carefully in developing this new enterprise.

"These men are not so much interested in the Zonolite company itself," said Mr. Alley. "Their object in securing control of the company is to protect themselves against any future possibility of being deprived of their raw material. By obtaining control of the Libby company, they are assured a continuous supply of raw material. Their chief endeavors will be expended in developing a market for the products they have perfected."

Mr. Alley will remain with the new owners in charge of production.

Much of the business will consist of the shipping of the raw product to Detroit and other eastern points where calcining plants will be built for the treating of the raw Zonolite. The local plant will be used, as heretofore, to supply the demand in its immediate trade territory.

Over 200,000 shares of the 370,000 shares issued by the Zonolite company have been optioned to the Detroit capitalists. All shares were optioned on the basis of 20% cash down payment at the rate of $1 a share, which is par value; 20% at $1.10 on August 1, 30% at $1.20, November 1, and the remaining 30% at $1.30 February 1.

There is an encouraging improvement in demand for the product, said Mr. Alley. An order for two carloads for use at the Fort Peck dam has already been secured and it is very probable this will develop into an order for about 30 carloads. It is to be used as a dry fill in houses under construction at the dam. Other new business recently obtained—in addition to the regular volume of business—comprises an order for 10 carloads of raw Zonolite to be shipped to the company's eastern distributors, said Mr. Alley.

The Zonolite deposit was discovered by Mr. Alley near Libby about 15 years ago. At that time its possibilities were unknown. By long experimentation and hard study, Mr. Alley became aware of its commercial possibilities and eventually succeeded in introducing it to the business world. The first published description of the material and of the deposit was in Rock Products.

Recent Data on Libby Vermiculite

W. S. Steel, of F. E. Schundler & Co., Joliet, Ill., and Brooklyn, N. Y., processors of vermiculite, or Zonolite, at the annual meeting of the American Institute of Mining and Metallurgical Engineers, last February, gave some interesting facts about this remarkable rock product, from which the following are taken:

The laboratory of F. E. Schundler & Co. at Joliet, Ill., has examined and analyzed samples of vermiculite from over sixty deposits in the United States. A survey of these reports indicates that the largest and purest vermiculite deposit of them all is the mine operated by the Zonolite Company situated across the Kootenai River, 14,000 ft. from the town of Libby, Mont., as the crow flies. By road, this distance is approximately seven miles.

Here, the entire mountain has been prospected. Borings have been made to a depth of 800 ft. Shafts have been sunk and numerous tunnels have been dug on this property during the past 10 years. Various geological surveys have estimated that the Zonolite property contains from 25 million to 100 million tons of almost pure vermiculite.

Occasional very thin ribbons of feldspar and quartz run through the solid vermiculite face, but these faults are so scattered and so minute, that classification of the crude vermiculite ore is almost unnecessary.

There are wide outcroppings of bare vermiculite and at no place is there in excess of 3 ft. of overburden.

Zonolite is quarried from an open cut at the top of the mountain. The rock is easily excavated with pick and shovel, consequently very little powder is used. Operations at present are being confined to a face approximately 50 ft. wide and 200 ft. deep.

The rock is broken down from the face, loaded into small broad tyred mine cars and carried to the primary screens. The fines are removed and hauled to the dump, while the larger pieces are loaded into motor trucks for delivery to the mill.

At present this long truck haul constitutes a considerable handicap, particularly during the winter months. Although county roads are kept open to the edge of the property all the year round snow banks on the private roads render them impassable at times.

A gravity operated aerial tramway is planned and the right of way partially cleared for construction at an early date. Operation of this tramway, when completed, will remove the necessity of screening at the pit and will permit a year round working schedule regardless of weather conditions. The output of predried, prescreened rock will then be limited only by the capacity of the screening and grinding equipment at Libby—and at a greatly reduced production cost.

Zonolite contains between 7% and 9% of chemically combined moisture. The percentage of free surface moisture is, of course, variable depending largely upon weather conditions. Inasmuch as free moisture is an expensive and superfluous quality, Zonolite is predried before grinding and screening.

The rock is passed through a rotary kiln heated to a temperature not exceeding 180 deg. F. by an oil-fired Dutch oven. Care must be exercised not to bring the drying heat high enough to disturb the combined moisture content and retard its ultimate full expansion, but at the same time it must be sufficient to reduce the free moisture to a maximum of 3%.

The expansion of Zonolite is much more rapid and complete where the input of crude ore is uniformly graded. For this reason all rock is first passed through a hammer mill and then separated into commercial grades.

The largest size passes a ½-in. screen and is retained on a ¼-in. mesh.

The intermediate grade passes the ¼-in. mesh and is retained on a No. 10 screen.

Material through the No. 10 and caught on a No. 28 screen is known as "plaster size" because of its wide use as an aggregate in cement and plaster mixes.

All ore passing a No. 28 screen is handled and expanded as one grade known as "fine" or "small" grade.

In addition to these four standard commercial grades, several uses have been developed for pulverized ore and for materials screened to other, more definite specifications. These special gradings are not carried in stock but are processed to meet specifications on order.

Zonolite breaks down into a plate-like formation in the crushing and grinding operations. Its cleavage is basal, crude; screened, dry Zonolite weighs between 80 and 90 lb. per cu. ft. Its specific gravity is 2.8 and its specific heat is approximately 2. The fusion point is 2462 deg. F.

Without exception, lightness in weight and complete expansion are the first considerations in the expanded material, and every step in the Zonolite process is planned

with that end in view. A considerable separation of foreign rock and particles of overburden is accomplished in the grinding and screening procedure. Over-burden and organic matter that survives the grinding and screening operations is ultimately consumed in the expanding furnace.

To complete the classification and separation of Zonolite from foreign matter, the rock is treated by the Schundler process, which is an operation that cannot be divulged, because of pending experiments for which patents have been applied.

The instantaneous introduction of crude Zonolite into the Schundler expanding furnace at a temperature of between 1,800 deg. and 2,000 deg. transforms the combined moisture into steam, which in an effort to liberate itself forces an explosive expansion of the plate-like crude ore into a honeycombed granule not unlike an accordion and extremely brittle or friable in composition.

Immediate cooling of the expanded material toughens the granules into durable, rubbery aggregate, ready for use.

For years, the expansion of Zonolite was performed in a rotary kiln, maintained at a temperature of 800 deg. F. The crude ore was introduced at the cold end traveling and tumbling slowly through the kiln. The resultant material was heavy. It was only partially expanded and it suffered considerable compression in its journey through the kiln. F. E. Schundler and his chemical director, P. S. Denning, in 1924 conceived the idea that maximum expansion and freedom from compression was only possible where the rock was accurately graded; instantly passed into a soaking heat above 1,600 deg. F. taken out quickly and immediately cooled.

For the past two years the Schundler plant has standardized on a direct-fired inclined gas furnace which has been very satisfactory. A measured feed of crude rock is carried by bucket conveyor into a small hopper directly over the furnace. The hopper discharges the same measured feed directly into the top of the furnace where it is met by a battery of six gas burners firing directly against the rock input. The material travels down the inclined floor of the furnace and is met at six-foot intervals by other batteries of burners which insure complete expansion of even the smallest particles. The furnace floor is at an angle of approximately 30 deg. and its length is 22 ft. The rock travels at a rate of 5 ft. per sec. and is therefore soaked in a heat of probably 1,860 deg. for between 4 and 5 sec. It is estimated that 1,000,000 B.t.u. of actual heat is required for expansion purposes, while records show a consumption of 2,400,000 B.t.u. per ton through the furnace, indicating a heat loss by this method of 1,400,000 B.t.u. per ton.

The latest model of the Schundler expanding unit is designed to reduce this loss to a minimum and the first furnace of this type is now under construction at Joliet.

At the discharge end of the furnace, the expanded material is picked up by a current of air and deposited in hoppers ready for bagging. Particles of foreign matter and partially expanded Zonolite too heavy for the fan to lift with 6-ounce pressure are dropped and discarded. This suction fan pulls the hot Zonolite through a current of cold air which cools it instantly and toughens its plates. It insures uniformity of weight in the finished product and completes the separation of foreign matter from the pure Zonolite.

The average weights of commercial run Zonolite are as follows:

Minus ½ plus ¼ mesh—4½ to 6½ lb. per cu. ft.
Minus ¼ plus 10 mesh—5¾ to 7 lb. per cu. ft.
Minus 10 plus 28 mesh—6¾ to 8½ lb. per cu. ft.
Minus 28 plus Pan. mesh—10 to 14 lb. per cu. ft.

As a thermal insulating medium, Zonolite is in a unique position. Its field of service ranges from the insulation of dry ice containers chilled to 60 deg. below zero, to protection for the tops of open hearth furnaces with standing temperatures in excess of 2,800 deg. F.

Loose Zonolite is gaining sales rapidly in the field of home insulation; for bake ovens, water-heaters, thermal jugs and food containers, stoves, furnaces, refrigerators and other insulated industrial units.

As a light weight aggregate in insulating plasters, cements, nailing concrete and other plastic hydraulic materials Zonolite adds its insulating and sound deadening properties to its weight saving advantages.

One part of Zonolite mixed with three parts of ordinary neat gypsum plaster, by weight, produces a plaster weighing 29.1 lb. per cu. ft., with a "K" factor at 75 deg. F. mean temperature of 0.90 B.t.u. per hour per sq. ft. per inch thick per degree temperature difference. By comparison, the standard brown mortar mix consisting of one part of neat gypsum plaster and two and one-half parts of Ottawa sand, by weight, has a "K" factor at the same temperature of 2.45 B.t.u., and a density of 105 lb. per cu. ft.

Loose Zonolite has been used widely in motion picture sound studios where it is important to confine noises to a given area. For this purpose, panels are constructed of 2 by 4's faced one side with fibre board and on the reverse side with fly screen. The area between the studding is filled with loose Zoholite.

Molded into tile 1 in. and ¾ in. in thickness, Johns-Manville Corp. produces an acoustical material of vermiculite which can be painted and cleaned and which affords excellent absorption coefficient at all cycles.

A series of exhaustive exploratory tests were made at Purdue University, to determine the highest percentage of Zonolite which could be used in concrete mixes without dangerous losses in structural strength. The proper grading of the aggregate, moisture content, methods of drying and molding were also studied.

These tests proved that Zonolite could be used to good advantage in nailing concrete or light partition blocks but would hardly be suitable for load bearing or heavy masonry uses.

Safe manufacturers have learned to mix Zonolite with alkaline earths in the construction of insulated safe walls with the greatest heat resistance value yet known.

Used as the second absorbent medium in a widely used silencer or muffler for internal combustion engines, Zonolite eliminates the necessity for baffle plates and increases the power of the engine in addition to increasing the acoustical value of the muffler.

Graded Zonolite granules, blended with mineral fibres and a refractory bond produce a plastic insulating cement which has found wide favor in the steel industry. More than fifty steel plants in the United States and Canada have open hearth furnaces now completely insulated with one or another type of Zonolite insulating cement. These furnaces are showing astounding savings in fuel and increased life.

Experience has shown that a 5-in. coating on furnace roofs; 3 in. on vertical walls above the charging floor, on regenerator roofs and neck arches; and from one to two inches on regenerator and slag pocket walls, offer the most satisfactory results.

Zonolite insulating cement has already gained favorable recognition and considerable use in the oil, rubber, automobile and railroad industries as well as in steel mills. It is preferred in these fields for its reclaimability and ease of application in addition to its high insulating values.

Pipe covering, secondary refractory brick, insulating refractories, blocks and molded products of every description are at this writing in the course of production in a dozen research laboratories.

The list of possibilities for Zonolite seems unlimited. The remarkable qualities of this unusual mineral are attested by its widespread commercial adoption in so short a period of time.

Recent Prices Bid

Burlington, Wis.: The Burlington Quarries Corp. was the low bidder on stone screenings at 98c per ton. The Waukesha Lime & Stone Co. bid $1.23 per ton and the Lannon Quarries of Beaver Dam, $1.42. R. C. Buchholtz of Burlington was awarded the contract for hauling the material at 99c per hour for man and team.

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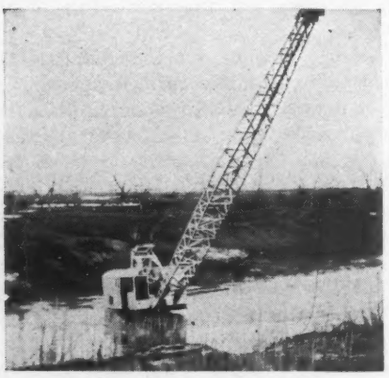
Wilkes Barre, Penn.: Only one bid for small order of crushed stone, from Kelly Run Stone Co., 462 tons of ½-in. chips, $2.35 a ton; total of $1,085.75; for 14 tons of heavy stone ballast, $2.35 a ton; total, $32.90; 14 tons of ¾-in. ballast, $2.35 a ton; total, $32.90.

New Machinery and Equipment

Cranes on Four-Year Job

FIRST UNITS of heavy equipment to arrive on the scene of the PWA project southeast of Glasgow, Mont., were two P & H model 700 cranes. They were unloaded at Paisley, Mont., and brought 32 miles across country to break trail for the Fort Peck damsite.

The cranes are a detail of the equipment being brought into action to build the $72,000,000 Fort Peck dam for control of the Missouri River. A reservoir 175 miles will be created. Government engineers believe that this will be the largest earth fill barrier ever undertaken. It is estimated that construction will be completed in about four years. Initial projects include the boring of four diversion tunnels each more than a mile long through shale bluffs.



Crane enroute to Fort Peck damsite

Truck Cab Over Engine

CONDENSED forward construction is the feature of two new Mack trucks recently introduced. Designers claim that in each case the cab-over-engine construction saves three feet in length over the corresponding conventional models in addition to providing one-third front and two-thirds rear distribution of gross weight.

A saving of five feet in turning radius also is claimed. Divided vertically in the center, the windshield of the new Mack has two sections, each of which may be opened or closed independently. The quarter inch plate glass is set in rubber on a steel frame, hinged at the top to prevent glare.

Quarter windows on each side of windshield in new truck give driver unobstructed view. Features for driver efficiency: Dome light, coat hooks, metal pocket and electric fan

At Chicago Fair

LIGHT WEIGHT and reduced speed requirements are stressed by Fairbanks-Morse and Co., in its showing of the opposed piston diesel at the 1934 Century of Progress Exposition in Chicago. This engine is being shown for the first time at the fair.

While this engine is designed primarily where weight and space are important factors they are equally adaptable, says the company, for stationary work. Engineers who designed this unit of the opposed piston type cylinder claim "it is inherently balanced because the reaction forces of the two pistons in the cylinder oppose and tend to counteract each other. This leads to higher rotative and piston speeds with a consequent reduction in weight."

Exhibit at 1934 Chicago Fair

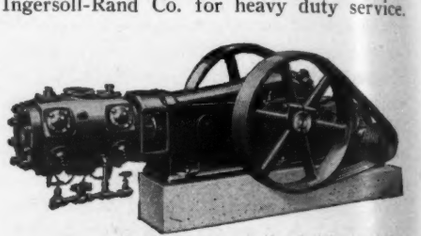
Noteworthy among industrial exhibits at this year's fair is that of the Link-Belt Co. in the General Exhibits Building. Working models include a pivoted bucket conveyor, a crawler dragline and a rotary railroad car dumper. Crawler cranes, excavating shovels and a unique new positive variable speed transmission are among the various additional units shown.

Rubber Putty

A COMPOUND similar in appearance and consistency to ordinary painter's putty is "Plastikon," a new type being marketed by B. F. Goodrich Rubber Co. It is claimed that this putty requires no mixing as it contains practically no oil. It is further said that the compound will resist corrosive chemicals and fumes. Because of its rubber content, high resistance is offered to moisture. A high degree of adherence to steel surfaces is claimed for it.

New Compressor

WITH ONE horizontal double-acting cylinder for operation at moderate speeds, the new "Class ES," single-stage, belt-driven compressor has been designed by Ingersoll-Rand Co. for heavy duty service.



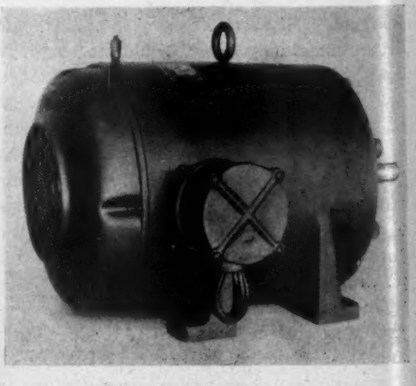
Single-stage compressor

It is made in sizes from 10 to 125 hp. and for discharge pressures from 5 to 150 lb.

The machine, claims the company, may well be used wherever full-load continuous service and "wherever power cost is an important consideration." It is suggested that this recently announced compressor will give economical standby service for large compressors when full capacity is not needed. A double row of tapered-roller bearings on each end of the crankshaft reduces friction and are said to make bearing adjustments unnecessary over a long period of time, making the unit adaptable for use particularly in isolated plants where there is little supervision.

Synchronous Motor

THE Ideal Electric and Manufacturing Co. of Mansfield, Ohio, announces a new synchronous motor. The "Self-Syn" motor is described as a compact, self-excited, self-synchronizing, self-contained motor unit that requires no external excitation—the exciter



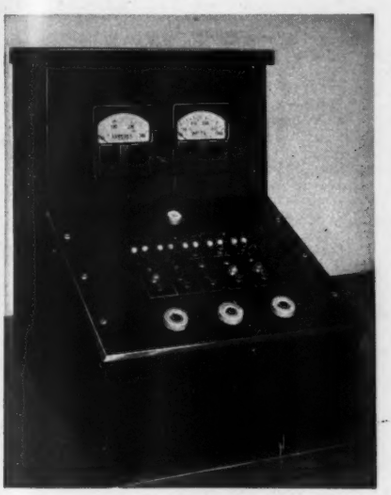
"Self-contained" motor

windings, direct current commutator, etc., being integral with the motor itself. Since no field switch or complicated synchronizing relay is necessary, this motor is started with a simple hand-operated compensator in the same manner as an ordinary induction motor, the manufacturer states.

It is said to possess the ability to automatically re-synchronize itself after having been pulled out of step by a line voltage dip upper compartment for the disconnects. The starter is designed to permit easy access to all working parts.

Supervisory Control

TO MEET the demand for inexpensive means for remote operation of various small stations, Westinghouse Electric and Manufacturing Co. has introduced "Polaricode, Jr." It is defined as a low cost, small size unit adaptable for industrial plants. Except for size, the unit is comparable to the company's other supervisory control systems. It can operate a maximum of five supervisory units. Only two telephone-type line wires are required between the dispatching point and the station.



Small control unit

"Trail-Mix"

THE KOEHRING CO. has developed a new 10-S "Dandie Trail-Mix" which has many of the improved features embodied in the recently announced four-wheel type mix. Charging skip of the new unit is free from obstruction at front and side in order to permit convenient and rapid loading. The unit is equipped with automatic skip-flow shaker which actuates the skip up and down.

Corporation Dissolved

AFTER AFFILIATION for three years it has been agreed to dissolve the Dorr-Oliver Corp., and the Dorr Co., Inc., and Oliver United Filters, Inc. Although these companies now will operate independently of each other it was stated that Oliver United Filters, Inc., will undertake further adaptation and marketing of the Dorrco Filter. Separation of the companies has been brought about "on an entirely friendly basis."

Respirator

A NEW TYPE patented development in dust respiratory equipment is announced by Mine Safety Appliance Co. The "Comfo-Respirator" has been subjected to laboratory tests which the company believes has proven the merit of its increased filter capacity, a special filter material provided to secure new low breathing resistance and high efficiency against fine dust.

Operator with new dust mask

Blow Pipe Valve

A BALL-SEAT needle valve now is being supplied on most Oxweld blowpipes according to a recent bulletin of the Linde Air Products Co. The new valve is interchangeable with units on all the company's old blowpipes. The new type of valve comprises a seat between blowpipe body and the needle valve. Tests have shown, says the company, that this type of seal allows rapid closing and opening of the valve.

The company also recently announced additions to its Prest-O-Lite line of equipment for soldering, brazing and heating. Lower price and simplicity are features of the new four-in-one outfit.

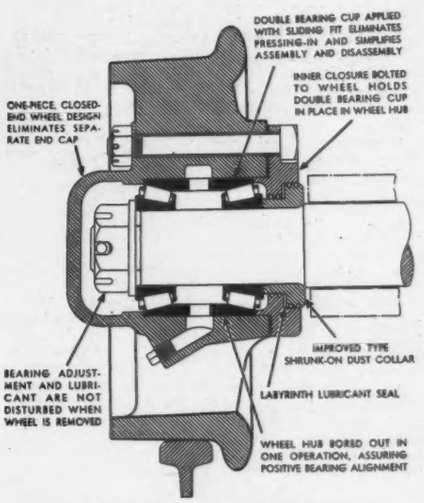
Welding Generator

Intended for portable service only, the Linde Air Products Co. now offers its type MP-4 portable acetylene generator. In introducing this unit, the company says: "It is intended especially to withstand abuse encountered in portable service—particularly in overland pipe construction." It has a carbide capacity of 150 lb.

Three layers in the new Goodrich Multi-V belt are balanced to resist stretch and cover wear. The company has compounded belts to reduce internal heat to a minimum.

For Quarry Cars

A NEW TYPE of bearing mounting for mine and quarry operating service has been announced by Timken Roller Bearing Co. In it a double cup bearing is utilized instead of two single cups. The shrunk-in-place steel dust collar, an old feature of mine car bearing mountings of this company, has been retained but modified to provide a labyrinth seal in conjunction with the inner closure.



Roller bearing mounting

Outer sealing is insured by elimination of separate end caps on the wheels. The unit is cast in one piece. To remove the new type wheel the operator simply loosens three bolts which clamp the inner closure and wheel in place.

Across-The-Line Starter

FOR MOTORS up to 15 hp. 220 volt and 30 hp. 440-550 volts, the Electric Controller and Manufacturing Co. announced in June a weatherproof dust-tight across-the-line oil immersed motor starter. Each unit is enclosed in a sealed case of black enamel.

At the option of the purchaser a self-contained ammeter in a dust-tight case is furnished. The start is arranged for remote control with automatic push button operation.

THE INDUSTRY

New Incorporations

Washington Sand and Gravel Co., Inc., New Orleans, La., 200 shares.

Riverside Sand and Gravel Co., Grand Rapids, Mich., to deal in sand and gravel.

West Kentucky Mineral Co., Nashville, Tenn., capitalization $60,000. Will G. Harris and Joe Davis are the incorporators.

Natural Asphalt Corp., St. Louis, Mo. C. L. Hoagland of Carthage and C. W. Crawford of Maplewood, Mo., are the incorporators.

Rockland Concrete Sales Co., Inc., has incorporated to manufacture concrete products at Union City, N. J., with a capitalization of $100,000.

Economy Block Co., Milwaukee, Wis. 150 shares at $100 each. To deal in concrete products. Incorporators are: W. G. and A. J. Seher, and Myra Koester.

Glenmont Sandstone Co., Cleveland, Ohio, has been incorporated through attorney Darmstatter for 250 shares and is located at 309 Rockefeller Building.

Wilfert Sand and Gravel Co., Eugene, Ore., has been incorporated with a capitalization of $5,000. E. C. and M. O. Wilfert and Maureen Russell are the incorporators.

Tindall Paving Co., Waterford, Wis., to deal in cement, gravel, sand, etc., for paving. 500 shares with no par value. L. L., F. K. and M. O. Tindall are the incorporators.

Washington-Idaho Lime Products Co., Spokane, Wash., to deal in lime and stone quarries, $250,000. R. H. Wills, E. R. Smith and E. J. Simons, Jr., are the incorporators.

Westboro Sand and Gravel Co., Northboro, Mass. 100 common shares no par value. W. D. Theall is treasurer. Vincent V. R. Booth and Foster E. Allison are also among the incorporators.

Wausau Wisconsin Granite Co., Wausau, Wis., to deal in stone, granite, marble, concrete and cement products. 100 shares at $100 each. A. W., G. E., E. R. and L. C. Prehn are the incorporators.

Watertown Quarry, Inc., Emmett, Wis., 100 shares of $10 each. Prepare for market, limestone and other minerals. Frieda and Fred J. Balmer, Leonard M. Akre, and Harold W. Hartwig are the incorporators.

Midwest Concrete Products Co., Sioux City, Iowa, has filed articles of incorporation with $10,000 capital. Paul Kaplan is president, Joseph Kaiman, vice president, Abe Kaplan, treasurer, and J. W. Hillman, secretary.

Personals

S. G. McAnally of the Giant Portland Cement Co., Allentown, Penn., was among the hosts at a recent meeting of the Allentown Foremen and Executives Club.

Hugh McCann of the Marquette Cement Manufacturing Co. has been elected president of the Illinois Valley Foremen's Club at a recent meeting in La Salle, Ill.

H. J. Johnson, formerly night superintendent of the Clark Granite Co., Rockville, Minn., now is superintendent of a new stone quarry recently opened at Madeira, Calif.

John Treanor of Los Angeles, president of the Riverside Cement Co., was elected third vice-president at a recent meeting of the California State Chamber of Commerce in Los Angeles, Calif.

Frank H. Smith, president of the Lawrence Portland Cement Co., was on the list of passengers when the "Albert Ballin" of the Hamburg-American Lines sailed June 6 from New York City.

Paul S. Klyne, Columbus, Ohio, son of the late Clark J. Klyne of Deerfield, now is president and treasurer of the newly-organized Lancaster Gravel Co., Hooker's Station, near Lancaster, Ohio.

Ray M. Raff, purchasing director of the Diamond Portland Cement Co., Middlebranch, Ohio, was elected vice-president of the Canton and Eastern Ohio Purchasing Agents Association which met recently in Canton.

Peter Clausen, Harry Walker and Earl Clarke of the Florida Portland Cement Co. in whose plant workers have not had a lost-time accident for more than 700 days recently produced a play, "Home, Sweet Hazardous Home," at a meeting of the Tampa Safety Council, Tampa, Fla.

Joseph V. Hogan has been elected president to succeed the late Joseph J. Hock as president of Arundel Corp., Baltimore, Md. Mr. Hogan has been associated with the company for the past 15 years and in recent years has been closely associated with the late Mr. Hock, as assistant in administration of the company's affairs.

Obituaries

Arthur E. Fretageot, 60, owner and president of the New Harmony Sand and Gravel Co., New Harmony, Ind., died June 2 in a hospital at Olney, Ill. Funeral services were held June 5 at New Harmony.

George A. Fisher, 55, general manager and vice-president of the Yosemite Portland Cement Co. plant, Merced, Calif., died May 23. The deceased came to Merced in 1926 to superintend construction of the company's plant. He became general manager in 1928 and last year was elected vice-president. He was formerly manager of the Monolith Portland Cement Co. in Kern County, Calif. At one time he was general superintendent of the Riverside Cement Co. plant, Riverside, Calif.

Edward D. Boyer, 77, cement plant engineer and past president of the American Concrete Institute, died in Bound Brook, N. J., June 12. His career in the cement manufacturing industry had extended over 43 years. He was known as an expert in the design and construction of cement plants. His home was in New York, N. Y. In 1931 he retired as technical service manager of Universal Atlas Cement with which he had been associated for 23 years. He was a member of the Engineers' Club in New York City, The American Society for Testing Materials, The Committee on Concrete Ships and Barges, the Technical Problem Co., the Portland Cement Association and many other organizations. Mr. and Mrs. Boyer were to have celebrated their golden wedding anniversary next March.

Sand and Gravel

T. W. Gravel Co., Tekamah, Neb., began operations recently.

Stripping operations have been completed at a new gravel pit in Bedford, Ia.

Snyder gravel pit near Barnard, Mo., has been stripped preparatory for working the deposits.

Chinook gravel pit, Chinook, Mont., is employing two shifts of men to work out about 40 cars of pit run gravel a day for railroad grades.

San-Orr Construction Co., Abilene, Kan., has installed a sand loading machine on the Rock Island right-of-way, west of the Enterprise depot for loading sand into cars.

Norman Davis, Sikeston, and E. F. Delaney of Holcomb, Mo., have taken over the Wilkey Gravel Co. of Risco, Mo. Machinery is being moved to the four-mile pit north of Campbell.

Cement

Cowell Cement Co. plant, Cowell, Calif., has been reopened with an increase in the number of workers from 70 to 237, according to W. H. George, secretary and general manager.

Beaver Portland Cement Co. plant, Gold Hill, Ore., recently resumed operations after a shutdown during which $50,000 worth of modernization work was completed. Included in the improvements are a new recrushing plant, new burning system, dust collection system and additional cement storage bins.

Quarries

A small rock crushing project recently was started near Macon, Mo.

Lee quarry east of Lamoni, Ia., has been the source of crushed rock for recent local highway projects.

Doniphan rock quarry, Atchison, Kan., recently was put in operation again with 35 men employed.

Greene County, Mo., has purchased a rebuilt rock crusher for use in connection with highway work.

Forty men were called to work recently when the large stone quarry at Arrow Rock, Mo., was opened.

W. H. Pringle, Pierre, S. D., has been awarded contract for the crushing of rock for the new court house.

Two hundred men recently were put to work in the government rock quarry six miles north of Wathena, Kan.

A full force of men recently was put to work on a relief project centering in the rock quarries near Canly, Kan.

A new and larger rock crusher has been purchased by county commissioners for use near Richland Center, Wis., and other county points.

Iola Oyster quarry has been reopened to furnish material for use in building the dam across the river at Canton, Mo. The quarry is located near LaGrange, Mo.

Eugene Keller quarry north of Louisiana, Mo., recently was opened after its management had been awarded a government contract for rock to be used in river improvement work.

A government operated rock quarry is being worked southwest of De Witt, Mo. The rock is being used on bank protection projects along the Missouri river near Miami and De Witt.

After a six weeks' shutdown the Palmer Woolf and Gray quarry, Winnfield, La., recently resumed operations. The company announced that about 60 people will be employed and that the monthly payroll will total approximately $1,500.

W. D. Lord has begun operations in his rock quarry at South Bend, Wash. Rock from the quarry will be used on highway projects. A dock has been constructed to handle rock at South Bend for barge shipping down the Willapa River.

County commissioners in Raymond, Wash., have leased the Bighill rock quarry to the state highway department on the basis of a charge of 2 cents a cubic yard of material taken and used. The agreement is for two years.

Reiling quarry adjacent to Bellevue State Park, Bellevue, Ia., is the source for a 15,000 yd. rock order recently obtained by C. C. Putman. The rock is being used in raising the wing dams in the Mississippi river south of Bellevue in connection with the government's nine-foot channel project.

Cement Products

Toledo Concrete Pipe Co., Toledo, Ohio, has been awarded contract for 342 feet of 48-in. concrete sewer pipe for use on Nissen road.

Jones Sand and Concrete Co., Hopkins Road, Youngstown, Ohio, has tripled its business this year over the last three years, according to Roy Jones, president.

Valentine Paganini, formerly of Roundup, Mont., has moved to Glasgow, Mont., to establish a plant for the making of concrete block to be used principally in providing house foundations. In addition to the block foundation units several types of rock facing and stepping blocks are being produced.

Price Bros. Co., Dayton, Ohio, was the successful bidder for construction of reinforced concrete pipe to be used on three sections of the Buck Creek interceptor sewer, Springfield, Ohio. The concern is occupying the same location as was used by Universal Concrete Pipe Co., Columbus, firm which was awarded pipe contract for the first four sections of the project.

Manufacturers

Chain Belt Co., Milwaukee, Wis., announces reopening of its office in Houston, Texas, under direction of J. W. Snavely.

Lincoln Electric Co., Cleveland, Ohio, has appointed Seth H. Taylor, Jr., as Pacific Coast manager. His headquarters will be in San Francisco.

Link-Belt Co., Chicago, Ill., is opening a warehouse in Dallas, Tex., for stocking Caldwell and Link-Belt conveying and power transmitting equipment.

Hercules Powder Co., Wilmington, Del., has appointed W. R. Ellis, assistant general manager of its explosive department. Mr. Ellis joined the organization in 1915.

ROBINS

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SPECIALISTS FOR 40 YEARS

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Bulletin No. 90

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Bulletin No. 82

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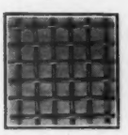

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QUALITY

MATERIAL HANDLING ROBINS EQUIPMENT

ECONOMY

Classified Directory of Advertisers in this Issue of Rock Products

For alphabetical index, see page 2

This classified directory of advertisers in this issue is published as an aid to the reader. Every care is taken to make it accurate, but ROCK PRODUCTS assumes no responsibility for errors or omissions. The publishers will appreciate receiving notice of omissions or errors, or suggestions

Acetylene Welding Rod
American Steel & Wire Co.

Agitators, Thickeners and Slurry Mixers
F. L. Smidth & Co.

Air Compressors
Fuller Co.
Gardner-Denver Co.
Traylor Eng. & Mfg. Co.

Air Filters
Fuller Co.

Air Separators
Raymond Bros. Impact Pulv. Co.

Armorite (for Chute Lining)
B. F. Goodrich Rubber Co.

Babbitt Metal
Joseph T. Ryerson & Son, Inc.

Backdiggers
Ohio Power Shovel Co.

Backfillers
Bucyrus-Erie Company
Harnischfeger Corp.
Ohio Power Shovel Co.

Balls (Tube Mill, etc.)
Allis-Chalmers Mfg. Co.
F. L. Smidth & Co.

Bearings
Joseph T. Ryerson & Son, Inc.
Timken Roller Bearing Co.

Bearings (Anti-Friction)
Timken Roller Bearing Co.

Bearings (Roller)
Timken Roller Bearing Co.

Bearings (Tapered Roller)
Timken Roller Bearing Co.

Bearings (Thrust)
Timken Roller Bearing Co.

Belt Fasteners
Flexible Steel Lacing Co.

Belt Lacing
Flexible Steel Lacing Co.

Belting (Elevator and Conveyor)
B. F. Goodrich Rubber Co.
Robins Conveying Belt Co.
United States Rubber Co.

Belting (Transmission)
B. F. Goodrich Rubber Co.

Bins
Blaw-Knox Co.
Pioneer Gravel Equipt. Mfg. Co. (Steel).
Traylor Eng. & Mfg. Co.

Bin Gates
Easton Car & Const. Co.
Fuller Co.
Robins Conveying Belt Co.
Traylor Eng. & Mfg. Co.

Bit Sharpeners and Tools
Bucyrus-Erie Co.

Blasting Cap Protectors
B. F. Goodrich Rubber Co.

Blast Hole Drills
Bucyrus-Erie Co.

Blasting Supplies
Hercules Powder Co.

Blocks (Pillow, Roller Bearing)
Timken Roller Bearing Co.

Boilers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Boots and Shoes
B. F. Goodrich Rubber Co.
United States Rubber Co.

Breakers (Primary)
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Buckets (Dragline and Slackline)
Blaw-Knox Co.
Bucyus-Erie Co.
Pioneer Gravel Equipt. Mfg. Co.
Wellman Engineering Co.

Buckets (Dredging and Excavating)
Harnischfeger Corp.

Buckets (Elevator and Conveyor)
Cross Engineering Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.
Robins Conveying Belt Co.

Buckets (Clamshell, Grab, Orange Peel, etc.)
Blaw-Knox Co.
Harnischfeger Corp.
Hayward Co.
Wellman Engineering Co.

Bulldozers
Blaw-Knox Co.

Bushings (Machined or Processed)
Manganese Steel Forge Co.

Cableways
American Steel & Wire Co.
General Electric Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Cap Crimpers and Fuse Cutters
Ensign-Bickford Co.

Caps (Blasting)
Hercules Powder Co.

Car Pullers
Robins Conveying Belt Co.

Castings
Babcock & Wilcox Co.
Eagle Iron Works (Grey Iron)
Timken Roller Bearing Co.

Cars (Quarry)
Easton Car & Const. Co.

Cement Making Machinery
F. L. Smidth & Co.

Cement Process
Cement Process Corp.

Cement Pumps
Fuller Co.
F. L. Smidth & Co.

Central Mixing Plants (Concrete)
Blaw-Knox Co.

Chain (Dredge and Steam Shovel)
Bucyrus-Erie Co.
Jeffrey Mfg. Co.
Manganese Steel Forge Co.

Chain (Elevating and Conveying)
Chain Belt Co.

Chain Drives
Chain Belt Co.

Chain Systems (Kilns)
F. L. Smidth & Co.

Chutes
Cross Engineering Co.

Chutes for Minimizing Segregation
Robins Conveying Belt Co.

Chutes and Chute Liners
Manganese Steel Forge Co.

Clamshells
Bucyrus-Erie Co.

Clips (Wire Rope)
American Steel & Wire Co.
Williamsport Wire Rope Co.

Coal Crushers and Rolls
Williams Patent Crusher & Pulv. Co.

Clutches
Fairbanks, Morse & Co.

Coal Pulverizing Equipment
Babcock & Wilcox Co.
Pennsylvania Crusher Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Compressed Air Rock Drills
Gardner-Denver Co.

Compressed Air Hoists
Gardner-Denver Co.

Compressors (See Air Compressors)

Controllers (Electric)
Fairbanks, Morse & Co.

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Robins Conveying Belt Co.

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Earle C. Bacon, Inc.
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Jeffrey Mfg. Co. (Vibrating)
Lewistown Fdy. & Mach. Co.
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Robins Conveying Belt Co.
F. L. Smidth & Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Conveyors (Pneumatic)
Fuller Company

Coolers (See Kilns and Coolers, Rotary)

Correcting Basins
F. L. Smidth & Co.

Couplings (Hose, Pipe, Etc.)
B. F. Goodrich Rubber Co.
United States Rubber Co.

Cranes (Clamshell)
Bucyrus-Erie Co.
Harnischfeger Corp.

Cranes (Crawler and Locomotive)
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.
Ohio Power Shovel Co.

Cranes (Overhead Traveling Electric)
Harnischfeger Corp.

Crusher Parts
Pennsylvania Crusher Co.

Crushers (Hammer)
Dixie Machy. Mfg. Co.
Pennsylvania Crusher Co.
Williams Patent Crusher & Pulv. Co.

Crushers (Jaw and Gyratory)
Allis-Chalmers Mfg. Co.
Earle C. Bacon, Inc. (Jaw)
C. O. Bartlett & Snow Co.
Good Roads Machy. Corp.
Lewistown Fdy. & Mach. Co.
Pennsylvania Crusher Co.
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.

Crushers (Single Roll)
Jeffrey Mfg. Co.
Link-Belt Co.
McLanahan & Stone Corp.
Pennsylvania Crusher Co.
Pioneer Gravel Equipt. Mfg. Co.

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Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Jeffrey Mfg. Co.
Traylor Eng. & Mfg. Co.

Dedusters
Blaw-Knox Co.

Derricks and Derrick Fittings
Harnischfeger Corp.

Diaphragms (Pump)
B. F. Goodrich Rubber Co.
United States Rubber Co.

Dippers and Teeth (Steam Shovel)
Bucyrus-Erie Co.
The Frog, Switch & Mfg. Co.
Marion Steam Shovel Co.

Ditchers
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.

Draglines
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.

Dragline Excavators
Bucyrus-Erie Co.
Harnischfeger Corp.
Marion Steam Shovel Co.
Ohio Power Shovel Co.

Dragline Cableway Excavators
Bucyrus-Erie Co.
Marion Steam Shovel Co.
Sauerman Bros.

Dragline Excavators (Walking)
Bucyrus-Monighan Company

Dragshovels
Bucyrus-Erie Co.

Dredge Pumps (See Pumps, Dredging)

Dredges
Bucyrus-Erie Co.
Hayward Co.
Marion Steam Shovel Co.
Morris Machine Works

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B. F. Goodrich Rubber Co.
United States Rubber Co.

Drill Sharpening Machines
Gardner-Denver Co.

Drill Tools
Bucyrus-Erie Co.

Drills
Bucyrus-Erie Co.
Timken Roller Bearing Co.

Drills, Hammer (See Hammer Drills)

Drills (Rock)
Gardner-Denver Co.

Drives (Short Center)
Allis-Chalmers Mfg. Co.
Fairbanks, Morse & Co.

Dryers
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
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Dust Collecting Systems
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Blaw-Knox Co.

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Fuller Co.

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Hercules Powder Co.

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General Electric Co.

Engineers
Productive Equipment Corp.
Robins Conveying Belt Co.
F. L. Smidth & Co.

Engines (Diesel)
Fairbanks, Morse & Co.

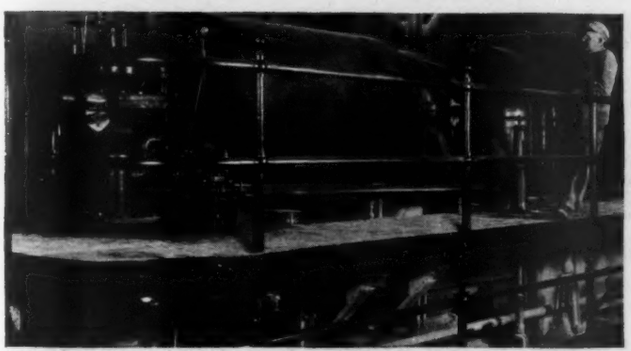
Engines (Gas, Kerosene, Oil)
Fairbanks, Morse & Co.

Engines (Steam)
Morris Machine Works

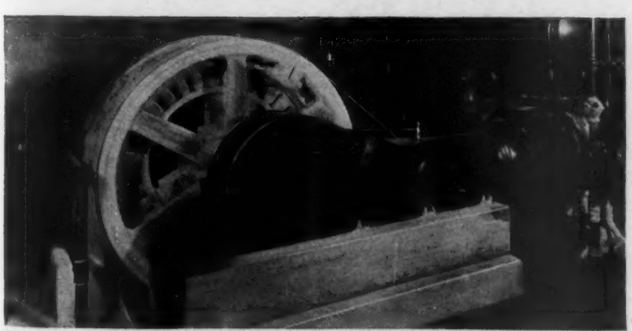
Excavating Machinery (See Shovels, Cranes, Buckets, etc.)

Explosives
Hercules Powder Co.

This cement kiln, 125 feet in length, is one of six in the Kosmos Portland Cement Company plant. This kiln is also equipped with Vardewerp Recuperator. The bearings carrying its enormous weight are protected by the right Gulf lubricant.



This 2500 K. W. turbine is one that supplies the power for the kilns. Gulf Lubricants keep it in continuous operation.



This air compressor in the Kosmos plant is kept free of carbon deposits with Gulf quality lubricants.

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Power, Maintenance and Lubricants Costs Materially Reduced by Modern Lubrication Practice

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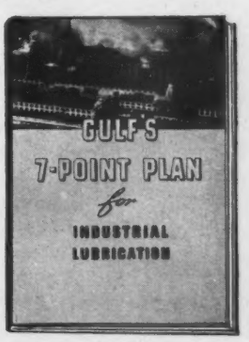

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For alphabetical index, see page 2

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Fuller Co. (Cement and Pulverized Material)
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Robins Conveying Belt Co.

Locomotive Cranes (See Cranes, Crawler and Locomotive)

Locomotives (Diesel)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Diesel-Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Electric)
Jeffrey Mfg. Co.

Locomotives (Gas—Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Oil—Electric)
The Fate-Root-Heath Co.
Plymouth Locomotive Works

Locomotives (Steam, Gas and Electric)
The Fate-Root-Heath Co.
General Electric Co.
Plymouth Locomotive Works (Gas)

Locomotives (Storage Battery)
General Electric Co.
Jeffrey Mfg. Co.

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McLanahan & Stone Corp.
Smith Engineering Works

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Gulf Refining Co.

Lubricants (Wire Rope)
American Steel & Wire Co.

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Harrington & King Perforating Co.

Magnets
General Electric Co.

Manganese Steel
Manganese Steel Forge Co., Inc.

Manganese Steel Castings
The Frog, Switch & Mfg. Co.

Manganese Steel (Plates and Sheets)
Manganese Steel Forge Co.,

Manganese Steel Parts
Manganese Steel Forge Co.,

Mechanical Rubber Goods
B. F. Goodrich Rubber Co.
United States Rubber Co.

Mills, Grinding (Ball, Tube, etc.) (See also Crushers, Hammer)
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Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Traylor Eng. & Mfg. Co.
Williams Patent Crusher & Pulv. Co.

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F. L. Smidth & Co.

Motor Trucks
General Motors Truck Co.

Motor Truck Scales
Fairbanks, Morse & Co.

Motors and Generators (Electric Units)
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Fairbanks, Morse & Co.
General Electric Co.
Harnischfeger Corp.

Oil Burners
Babcock & Wilcox Co.

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Gulf Refining Co.

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United States Rubber Co.

Packings (Pump, Valve, Etc.)
B. F. Goodrich Rubber Co.
United States Rubber Co.

Perforated Metal
Chicago Perforating Co.
Cross Engineering Co.
Harrington & King Perforating Co.
Hendrick Mfg. Co.
Morrow Mfg. Co.

Plate (Double Corrugated)
Hendrick Mfg. Co.

Portable Conveyors
Fuller Company
Robins Conveying Belt Co.

Portable Crushing and Screening Unit
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works
Williams Patent Crusher & Pulv. Co.

Power Units
Fairbanks, Morse & Co.

Pulverators
Allis-Chalmers Mfg. Co.

Pulverizers (See also Crushers, Mills, etc.)
Allis-Chalmers Mfg. Co.
Babcock & Wilcox Co.
Dixie Machy. Mfg. Co.
Jeffrey Mfg. Co.
Raymond Bros. Impact Pulv. Co.
F. L. Smidth & Co.
Williams Patent Crusher & Pulv. Co.

Pumps (Air Lift)
Fuller Co.

Pumps (Cement)
Fuller Co.

Pumps (Cement Slurry)
Morris Machine Works
F. L. Smidth & Co.
A. R. Wilfley & Sons

Pumps (Centrifugal)
Allis-Chalmers Mfg. Co.
Fairbanks, Morse & Co.
Morris Machine Works
A. R. Wilfley & Sons

Pumps (Drainage)
Fairbanks, Morse & Co.

Pumps (Dredging)
Bucyrus-Erie Co.
Morris Machine Works

Pumps (Pulverized Coal)
Babcock & Wilcox Co.

Pumps (Sand and Gravel)
Allis-Chalmers Mfg. Co.
Morris Machine Works
A. R. Wilfley & Sons

Railway Equipment
General Electric Co.

Railways (Electric)
General Electric Co.

Ready-Mixed Concrete (Truck Mixer Bodies)
Blaw-Knox Co.

Ready-Mixed Concrete Plants
Blaw-Knox Co.

Respirators
Pulmosan Safety Equipt. Corp.

Road Machinery
Blaw-Knox Co.
Good Roads Machy. Corp.
Harnischfeger Corp.
Marion Steam Shovel Co.

Rock Drills (See Drills, Rock)

Rod Mills
Traylor Eng. & Mfg. Co.

Roller Bearings
Timken Roller Bearing Co.

Roofing and Siding (Steel)
Joseph T. Ryerson & Son, Inc

Rope, Wire (See Wire Rope)

Rubber Covered Screens
B. F. Goodrich Rubber Co.

Safety Equipment
Pulmosan Safety Equipt. Corp.

Sand Drag
Smith Engineering Works

Sand Separators
Pioneer Gravel Equipt. Mfg. Co.

Sand Settling Tanks
Pioneer Gravel Equipt. Mfg. Co.
Smith Engineering Works

Scales (Automatic Proportioning)
Fairbanks, Morse & Co.

Scales (Cement)
Fairbanks, Morse & Co.

Scales (Railway Track and Truck)
Fairbanks, Morse & Co.

Scrapers (Power Drag)
Blaw-Knox Co.
L. P. Green
Harnischfeger Corp.
Pioneer Gravel Equipt. Mfg. Co.
Sauerman Bros

Screens
Allis-Chalmers Mfg. Co.
Bartlett, C. O., & Snow Co.
Chicago Perforating Co
Cross Engineering Co.
Good Roads Machy. Corp.
Harrington & King Perf. Co.
Hendrick Mfg. Co.
Jeffrey Mfg. Co.
Manganese Steel Forge Co.,
Morrow Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
John A. Roebling's Sons Co.
Smith Engineering Works
Traylor Eng. & Mfg. Co.
Universal Vibrating Screen Co.

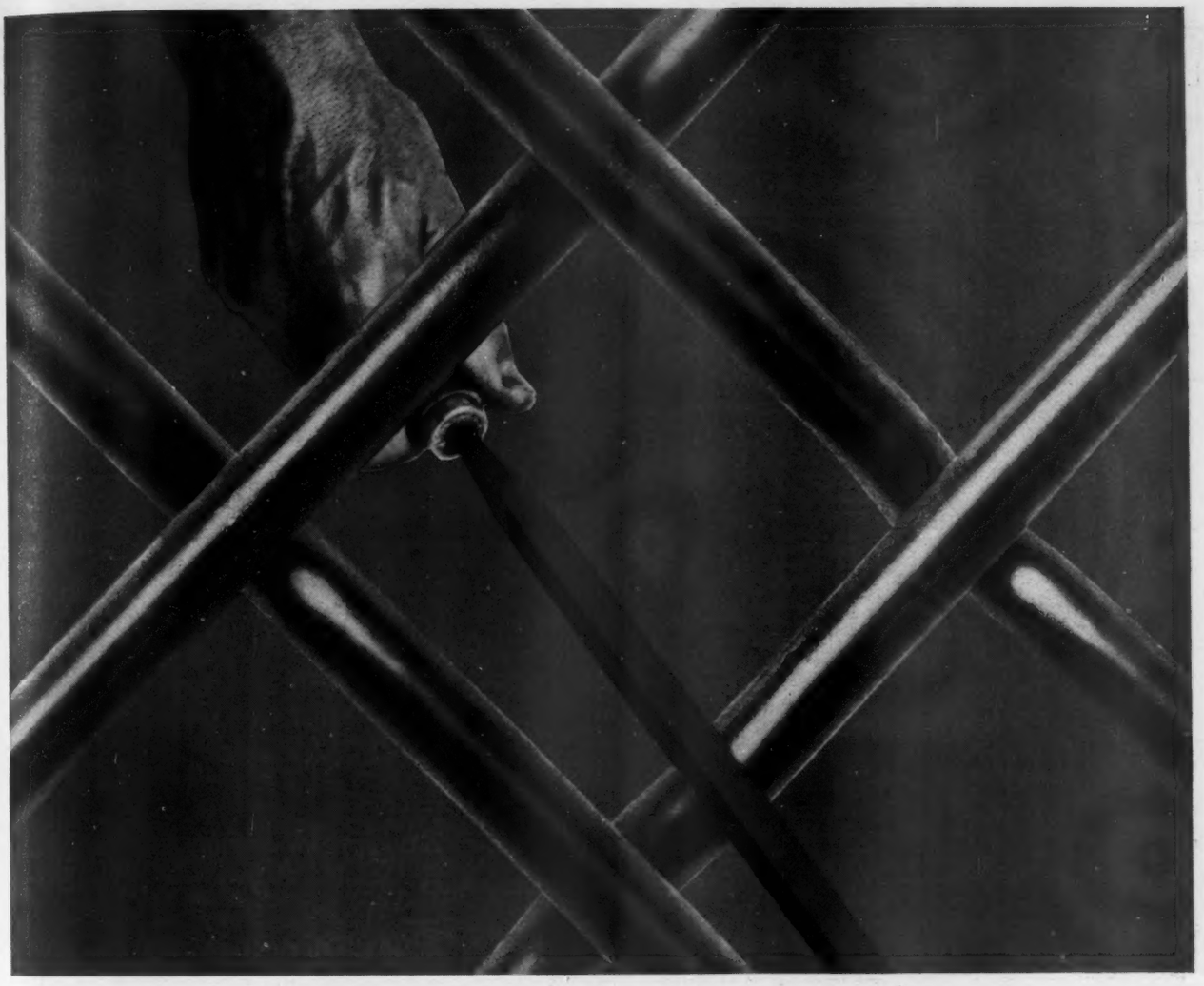
Screens, Scalping (Hercules and Standard)
Smith Engineering Works

Screens (Vibrating)
Jeffrey Mfg. Co.
Pioneer Gravel Equipt. Mfg. Co.
Productive Equipment Corp.
Robins Conveying Belt Co.
Smith Engineering Works
Universal Vibrating Screen Co.
Williams Patent Crusher & Pulv. Co.

Screens, Washing (Hercules, Ajax and Standard)
Smith Engineering Works

Screw, Rewasher (Single and Twin)
Smith Engineering Works

Scrubbers
Lewistown Fdy. & Mach. Co.



Try to File ROL-MAN!

The Steel that Rises to the Occasion

ROL-MAN

A TRUE MANGANESE STEEL

SCREEN CLOTH

– Welding Rods –
Forgings–Plate Products

ROL-MAN cold forges and hardens itself in service, to exactly meet your requirements. It is a *Tough-hard,* processed manganese steel when it leaves our shops, but in screening service, the harder the knocks and abrasion, the harder its surface becomes. As this outside crust slowly wears, the metal beneath increasingly hardens to resist further wear. ROL-MAN is thus never hard enough to be easily broken or soft enough to rapidly wear—This peculiar attribute of ROL-MAN can be proved with a file, for after a few strokes (light or heavy) the steel hardens and the file loses its bite—ROL-MAN Manganese Steel Screen Cloth with Patented *Double Lock Mesh* Weave, which provides a relatively flat free screening surface and prevents distortion of openings, can be applied to every make of vibrator. Put in a ROL-MAN now and measure accurate screening life by months instead of weeks. Complete information and prices on request.

MANGANESE STEEL FORGE CO.
Richmond St. and Castor Ave. Philadelphia

Classified Directory of Advertisers in this Issue of ROCK PRODUCTS

For alphabetical index, see page 2

Seal Rings
Traylor Eng. & Mfg. Co.

Separators (Slurry)
F. L. Smidth & Co.

Shovels, Power (Steam, Gas, Electric, Diesel, Oil)
Bucyrus-Erie Company
Harnischfeger Corp.
Marion Steam Shovel Co.
Ohio Power Shovel Co.

Silos
F. L. Smidth & Co.

Skip Hoists and Skips
Robins Conveying Belt Co.

Slings (Wire Rope)
American Cable Co., Inc.
American Steel & Wire Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Sockets (Wire Rope)
American Steel & Wire Co.

Speed Reducers
Traylor Eng. & Mfg. Co.

Spouts, Chutes (See Chutes and Chute Liners)

Sprockets and Chain
Jeffrey Mfg. Co.

Steel Bars
Timken Roller Bearing Co.

Steel (Bars, Shapes, Plates, etc.)
Joseph T. Ryerson & Son, Inc.

Steel (Electric Furnace)
Timken Roller Bearing Co.

Steel (Open Hearth)
Timken Roller Bearing Co.

Steel (Special Alloy)
Timken Roller Bearing Co.

Steel (Special Analysis)
Timken Roller Bearing Co.

Stokers
Babcock & Wilcox Co.
Combustion Engineering Corp.

Tanks
Combustion Engineering Corp.
Pioneer Gravel Equipt. Mfg. Co.

Texrope Belts (for Texrope Drives)
B. F. Goodrich Rubber Co.

Tires and Tubes
B. F. Goodrich Rubber Co.
United States Rubber Co.

Track Equipment
Easton Car & Const. Co.

Tramways (Aerial Wire Rope)
American Steel & Wire Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Transmission Belting (See Belting)

Transmission Machinery
Allis-Chalmers Mfg. Co.
Timken Roller Bearing Co.

Trippers
Robins Conveying Belt Co.

Truck Bodies (Quarry)
Easton Car & Const. Co.

Truck Bodies (Ready Mixed Concrete)
Blaw-Knox Co.

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Blaw-Knox Co.

Trukmixers
Blaw-Knox Co.

Tube Mills (See Mills, Ball, Tube, etc.)

Tube Mill Liners (See Mill Liners)

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B. F. Goodrich Rubber Co.
United States Rubber Co.

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Timken Roller Bearing Co.

Valves (Pump)
B. F. Goodrich Rubber Co.
United States Rubber Co.

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Washers (Sand, Gravel and Stone)
Allis-Chalmers Mfg. Co.
Eagle Iron Works
Pioneer Gravel Equipt. Mfg. Co.
Traylor Eng. & Mfg. Co.

Waste Heat Boilers
Combustion Engineering Corp.

Weighing Equipment
Fairbanks, Morse & Co.

Welding and Cutting Apparatus
General Electric Co.
Harnischfeger Corp.

Welding Rod
American Steel & Wire Co.
Manganese Steel Forge Co.
Joseph T. Ryerson & Son, Inc.

Welding Wire
American Steel & Wire Co.
John A. Roebling's Sons Co.

Well Drills
Bucyrus-Erie Co.

Wire (Manganese Steel)
Manganese Steel Forge Co.

Wire (Rubber Insulated)
United States Rubber Co.

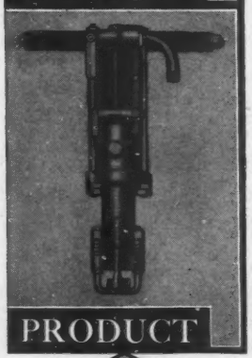
Wire Cloth
Manganese Steel Forge Co.
John A. Roebling's Sons Co.

Wire Rope
American Cable Co., Inc.
American Steel & Wire Co.
A. Leschen & Sons Rope Co.
Macwhyte Company
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Wire Rope Fittings
American Cable Co., Inc.
American Steel & Wire Co.
A. Leschen & Sons Rope Co.
John A. Roebling's Sons Co.
Williamsport Wire Rope Co.

Wire Rope Slings (See Slings, Wire Rope)

Wire Rope Sockets (See Sockets, Wire Rope)



GARDNER-DENVER
S-55 SINKER

PERFECTLY BALANCED DESIGN . . .

The greatest drilling capacity — PLUS the easiest riding — PLUS conservative air consumption.

That is what is meant by "perfectly balanced design" in the Gardner-Denver S-55 Sinker.

But let's put it in terms of YOUR job. With the S-55, you can drill *faster* than with any other drill of its class — a fact proved by wide experience. Your men can use the S-55 *continuously* because it is so free from vibration — you make greater daily progress. Your cost sheets will reflect the S-55's remarkably low air consumption as well as its freedom from maintenance.

The S-55 is the most popular 55-pound drill on the market today because it is designed *to fit field conditions*. Write us and we will send a representative to demonstrate it — no obligation on your part.

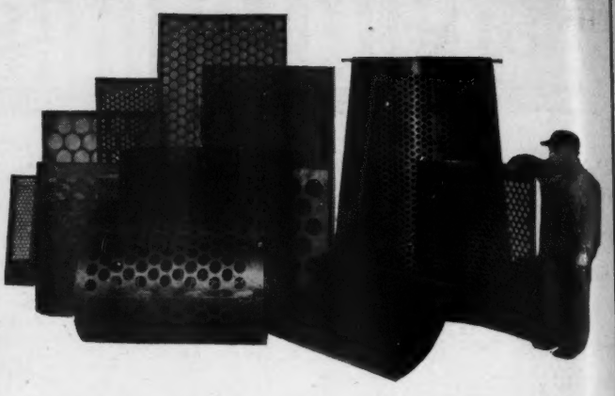
GARDNER-DENVER CO., 104 Williamson St., Quincy, Ill.

Horizontal, Vertical, Air-Cooled and Portable Compressors • Steam and Power Pumps
Rock Drills, Accessories • Paving Breakers • Clay Diggers • Hoists

GARDNER-DENVER

MAKES AIR DO MORE AND COST LESS

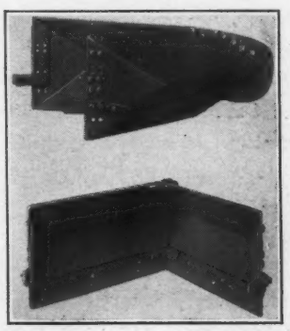
SCREENS of Perforated Metal



For Sand, Gravel, Stone and Ore. Perforations of all standard types, also of unusual sizes and layouts to give large production and reduced screening costs.

The Harrington & King PERFORATING Co.

5650 Fillmore St., Chicago, Ill. 114 Liberty St., New York, N. Y.



Re:
Infringement Charges

The Green Scraper

has been the subject of infringement charges, and thereby, involved in litigation which extended over a period of more than eleven years.

SUCH CHARGES WERE NOT SUSTAINED IN COURT: THE LAST OF THAT LITIGATION HAS BEEN FINALLY DISPOSED OF AND THE GREEN SCRAPER IS NOW ENTIRELY FREE FROM INFRINGEMENT CHARGES.

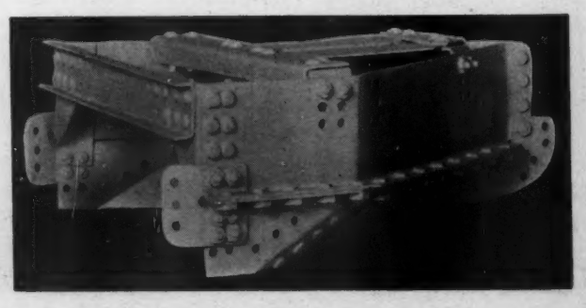
We can now furnish five different types of scrapers, all embodying one or more EXCLUSIVE GREEN IMPROVEMENTS, COVERED BY PATENTS.

The scraper illustrated above is our low-priced, reversible scraper which we first placed on the market in 1920.

The scraper illustrated below is one of our more improved scrapers, especially adapted for hard digging. It is provided with a vertically adjustable float (patented) to regulate the amount of the load and can be furnished with the bottom detachable by the use of outwardly extending flanges, as shown, or with wearing plates as illustrated above.

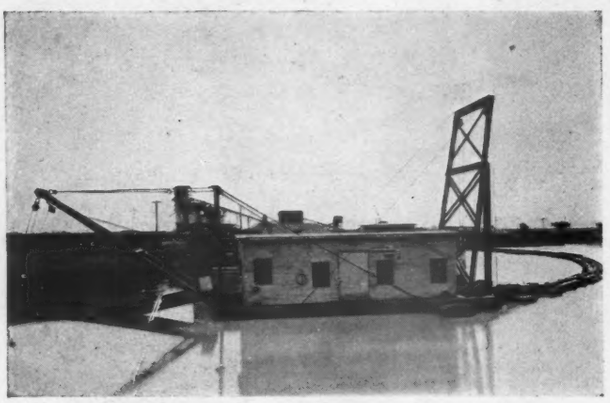
Say: "I'm interested."

L. P. GREEN, 53 West Jackson Boulevard, CHICAGO, ILL.



Sand and Gravel Production

at maximum economy



WHETHER your sand and gravel bed is loose or compacted, is composed exclusively of fines or contains coarse gravel and large boulders, or requires special appliances of any nature, you will find a Morris Dredge the most advantageous equipment for working it effectively and at lowest possible cost.

Morris Dredges are furnished for operation by electric motor, steam engine, or internal combustion engine, with standard or heavy duty dredging pumps which may be fitted with special alloy linings for severe service, and may be built portable when desired. The pump can be furnished separately or together with hull and all necessary accessories as a complete dredge unit for any operating requirements.

For two-thirds of a century Morris has been specializing on centrifugal pumps for handling solid materials of every nature. This experience has resulted in several distinctive features of design and construction that have made Morris Dredging Pumps the acknowledged leaders in their field. The Morris catalogue describes these features in detail and will show you just why Morris Pumps can be depended upon to serve you long and well.

Send the coupon today for free bulletin

MORRIS
CENTRIFUGAL PUMPS

Morris Machine Works, Baldwinsville, N. Y.

Please send catalog on Dredges for sand and gravel production.

Name .....

Company .....

Address .....

R P 7-34.

Get the Most Out of Your Vibrating Screens

For the ultimate in screening efficiency equip your vibrating screens with Hendrick Double Corrugated Plate, "Sqround" Mesh.

The double corrugations insure better tumbling action, better screening. The "Sqround" Mesh combines the capacity of square mesh with the accuracy of round perforations.

Hendrick Double Corrugated Plate with "Sqround" Mesh is available in any size perforations, straight or staggered. "Sqround" Mesh is likewise available in flat plate.

Write for details.

HENDRICK MFG. CO.
47 Dundaff Street Carbondale, Pa.

Baltimore Birmingham Boston
Cincinnati Cleveland Detroit Hazleton
New York Philadelphia Pittsburgh

ALLIGATOR
TRADE MARK REG. U.S. PAT. OFFICE
STEEL BELT LACING

NEARLY a thousand belts per hour are laced with Alligator Steel Belt Lacing, day in day out, year in year out. Easy, rapid application with a hammer as the only tool; the hammer-clinched, vise-like grip on the belt ends, preventing friction of the plies; the patented, sectional, steel rocker pin which absorbs friction in the hinged joint; the great surplus of strength and long service—only Alligator Steel Belt Lacing combines these features which make it the choice of millions of belt users. Smooth on both sides. Easily separable. Reliable both on light and heavy duty drives. Eleven sizes. Made also in Monel Metal. Sold at wholesale and retail throughout the world.

FLEXIBLE STEEL LACING CO.
4684 Lexington Street, Chicago
In England at 133 Finsbury Pavement, London, E. C. 2

CLASSIFIED ADVERTISEMENTS

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Box numbers in care of our office. An advertising inch is measured vertically in one column. Three columns, 30 inches to the page.

CLASSIFIED — Displayed or undisplayed. Rate per column inch, $4.00. Unless on contract basis, advertisements must be paid for in advance of insertion.

Used Equipment For Sale

FOR SALE

MARION STEAM SHOVEL—Model 36, (Revolving), 24-ft. boom, 1½ cu. yard, mounted on railway wheels.

LOCOMOTIVE CRANE, Brownhoist, Elevated Pedestal Type, Pedestal height 11 ft. 2 inches, Boom length 48 ft. 3 inches, equipped with bucket.

CAMERON CENTRIFUGAL PUMPS — Three No. 10, double suction Volute, 2,000 gallon per minute, Motor driven, D.C. 230 volt, connected to 100 H.P. Reliance motor, 1,100 R.P.M., switchboard included.

RIDGWAY GENERATOR SETS — Two 200 K.W., 200 R.P.M., 240/250 volt D.C. generators direct connected to Ridgway 18x22 Corliss four-valve engines, switchboard included.

LOCOMOTIVES — One 65-ton, 6-wheel: One 40-ton, 4-wheel, H. K. Porter Saddle tank locomotives, Standard gauge.

CRUSHING MACHINE—Two Sturtevant Mill Co. sampling machines for Laboratory use; One Roll Jaw-Type for coarse grinding; one for fine grinding.

Address Box 621, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

BARGAINS

Special **Extra**

5—21-ton 11x16" Vulcan 36" gauge 4-wheel saddle tank locomotives, Code boilers, built 1923.

2—21-ton 11x16" Porter 36" gauge 4-wheel saddle tank locomotives, Code boilers, built 1921.

1—21-ton 11x16" American 36" gauge 4-wheel saddle tank locomotive, Code boiler, built 1922.

75—4-yard WESTERN 36" gauge steel under frame 2-way side dump cars, box-door type.

All purchased recent Court Sale at Edgefield, South Carolina. Immediate shipment. Thoroughly rebuilt since last used.

BIRMINGHAM RAIL & LOCOMOTIVE CO.
Birmingham, Alabama

Shovels:
1—32 Marion Steam Cats., 1½ Yd.
175-B Bucyrus Steam 4-wheel trucks.
100-B Bucyrus Erie Electric Cat., 3 Yd.
2—Jordan Std. Ga. Air Spreaders.
19—K&J 16-Yd. Std. Ga. Air Dump Cars.
20—Koppel 30-Yd. Std. Ga. Air Dump Cars.
1—Std. Ga. Nordberg Track Shifter.
2—36" Ga. Porter Steam Locos.
6—4-Yd. 36" Ga. Western Dump Cars.
19—Easton 4-Yd. 48" Ga. All Steel End Dump Quarry Cars.
1—5-Ton 48" Ga. Plymouth Gas Loco.
1—8-Ton Std. Ga. Plymouth Gas Loco.
1—60 Caterpillar Tractor.
1—8-Yd. Athey Crawler Wagon.
4—1¼-Yd. Maney Scrapers.
2—28S Koehring Mixers.
1—27E Ransome Paver.
1—8' Riddell Grader Cats., Deering Power.
1—12' Galion Leaning Wheel Grader.
1—12' Super-Mogul (Russell) Grader.
1—856' Sullivan Angle-Cpd., Compressor with 152 HP, 3 PH, 60 Cy., 220 V Motor.

DERRICKS, BOILERS, OIL ENGINES, ROLLERS, GRAVEL PLANTS, CRUSHERS, ALL KINDS OF EQUIPMENT. TELL US WHAT YOU WANT.

THE T. J. LANE CO.,
Box 458 **Springfield, Ohio**

FOR SALE

1—12' Gayco Separator, model 21.
3—Hardinge Mills, 4½'x16", 5'x22", 8'x30".
1—Allis-Chalmers No. 2 Pulverator, 20"x12'.
2—Allis-Chalmers 10x7", 24x12" Jaw Crushers.
2—Sturtevant No. 1, No. 1½ Rotary Fine Crushers.
1—Sturtevant No. 1 Ring Roll Mill.
2—Raymond five-roll, three-roll Mills.
6—No. 0000, No. 00, No. 1 Raymond Mills.
1—Tyler Hummer, type 31, double unit screen.

STEIN-BRILL CORPORATION
183 Varick St., New York, N. Y.
We buy your surplus equipment.

FOR SALE
REVOLVING SCREENS

46" diameter by 24' long, extra heavy type revolving cylindrical screens, especially adapted to heavy screening service, with extra large panels and heavy construction permitting easy handling of large capacities. Each screen supported at each end by large trunion wheels. Strongly reinforced, riveted steel frame.

Also new and second-hand rails, cars, trucks, pipe, wire rope, etc. Write for prices and terms.

J. ROSENBAUM & SON
Centerville, Iowa

FOR SALE

1—1030 Champion Roller Bearing Reduction Crusher.
1—No. 6 Champion 12x26 Jaw Crusher.
2—⅜ Yd. Thew Gas. Cat. Shovels.

JOHNSON AND HOEHLER, INC.
Lansdowne, Pa.

"SERVICE SUPPLY SPECIALS"
1—1000 cu. ft. Chicago Compressor—2-stage, with intercoolers, 19x11x12-type OCB, complete with 200 H.P. sync. motor, starter, etc.—LIKE NEW.
1—253 cu. ft. Chicago Compressor—10x10-type N.S.B. complete with 40 H.P. G.E. motor, starter, etc.
1—75B Lorraine 1¼-yd. Shovel and Crane.
2—Caterpillar "60" Tractors and Bulldozers.
2—1¼-yd. Clamshell Buckets.

SERVICE SUPPLY CORPORATION
20th and Venango Sts. Phi'adelphia, Pa.

1—2-yd. MARION 480 Shovel-Crane.
1—2-yd. Bucyrus 50B Shovel.
1—1¼-yd. BYERS Crane.
1—1¼-yd. LORAIN 75 Shovel.
1—1-yd. KOEHRING Crane.
1—1-yd. P. & H. 600 Shovel.
1—¾-yd. P. & H. Shovel-crane.
1—½-yd. BYERS Shovel-crane.
30—4-yd. Heavy Steel Stone Skips.
1—265-ft. Gas Portable Compressor and Jackhammers.
Electric Draglines, 2- and 3-yd.
Gasoline Draglines, ½- and ¾-yd.
1—BROWNING Truck-crane.
24" Conveyor 65 and 170 ft.
Clamshell Buckets, ½ to 1½ yd.
Crushers 10x18; 15x38; 18x30; 11x26; 12x20.

J. T. WALSH
500 Brisbane Bldg., Buffalo, N. Y.

Marion Gas Electric ¾-Yard Shovel.
1-Yd. Osgood Crawler Shovel, rebuilt.
Side and Center dump cars.
Locomotives—75-ton Switcher, code boiler—saddle tank type, 18 to 65 tons.
Cranes and Draglines, various sizes.

SOUTHERN IRON & EQUIPMENT CO.
Atlanta, Georgia

CRUSHER FOR SALE

One 9"x21" Telsmith Roller Bearing Jaw Crusher with feed bin and 15 H.P. General Electric Motor, V belt drive. All in good condition.

ERIE SAND & GRAVEL CO.
ERIE, PENNA.

BARGAIN
CONVEYOR

New Jeffrey belt portable conveyor, 18 ft. x 16 in., Serial 832. Equipped with motor, A.C. current. Has never been used. Will sacrifice for cash. Address **Box 629, care of Rock Products, 330 South Wells Street, Chicago, Illinois.**

USED EQUIPMENT WANTED

WANTED

Good used ladder chain for forty-foot Eagle Swintex ladder, or would consider complete ladder. State location, price, etc.

Address Box 625, care of Rock Products, 330 South Wells Street, Chicago, Illinois.

CONSOLIDATED offers **GOOD USED CRUSHING, PULVERIZING, DRYING AND FILTERING EQUIPMENT—COMPLETE**

Crushing Plants; Diesel, Gasoline, Electric Cranes and Shovels; Hoists; Compressors; Pumps; Dragline and Excavating Equipment; and all sizes and types of Jaw, Gyratory and Roll Crushers; Swing Hammer Mills; Elevators; Belt Conveyors; Rotary and Vibrating Screens; Rotary Kilns and Dryers; Raymond and other fine Pulverizers; Air Separators; Hardinge Ball and Pebble Mills; Silex and iron lined Tube Mills, etc. Send for Bulletin No. 14.

CONSOLIDATED PRODUCTS CO., Inc., 15-16-17 Park Row, New York City
Tel. Barclay 7-0600 **Shops and Yards at Newark, N. J., new covers eight acres**

CLASSIFIED ADVERTISEMENTS

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WANTED

Sand and Gravel Bins with weighing batchers, 125 to 200 ton capacity.

Central Sand & Gravel Co., Memphis, Tenn.

BUSINESS OPPORTUNITIES

FOR SALE

Formerly the Florida Travertine Corporation property, quarry and mill, located near Bradenton, Florida. Containing 67 acres with railway siding into mill. Quarry equipment has large derrick, hoisting machinery, air compressor, caterpillar dragline, drilling machines, large suction pump, motor, etc. Tool and equipment sheds. Mill has four gang saws, 25-ton traveling crane, carborundum saws, planers, polishing machines, etc., all electrically equipped ready for operation. Office building with safe, desks, drawing room and equipment.

Inspection invited—Price—One-tenth of estimated value. Present owners forced to take property on mortgage.

Address, JAMES F. VALDES, Bradenton, Florida

FOR SALE

Lime plant and property in Ste. Genevieve County, Missouri, with R. R. switch and Mississippi River loading facilities and equipment. Ideal plant for high calcium chemical lime.

B. E. ROMBAUER, Brickey's, Mo.

Want to Lease Sand and Gravel Plant with option to purchase, or will manage and operate a plant with percent of profits. Good deposit and potential market necessary. Furnish A1 references.

Address Box 624, care of Rock Products, 330 South Wells Street, Chicago, Ill.

BUSINESS OPPORTUNITIES

COMPLETE ROCK CRUSHING PLANT FOR SALE

AT A BARGAIN

The entire equipment and quarry lease of the Jacksboro Stone Products Co., of Jacksboro, Texas, can be purchased at a bargain. Address The First National Bank of Jacksboro, Texas.

POSITIONS WANTED

GENERAL CEMENT PLANT OPERATOR—Qualified to assume full charge of any size plant. 18 years' actual experience as assistant chief chemist, quarry, mill, kiln, packing, maintenance, and construction foreman. 8 years full charge of all plant operations, maintenance and control of 8,000-barrel plant. Location and position to start immaterial. Address Box 603, care of Rock Products, 330 South Wells Street, Chicago, Ill.

ENGINEER—YOUNG MAN WITH TEN (10) years' experience on conveying machinery and structural engineering, familiar with screening and crushing plants, desires any kind of a position. References as to character and ability. Location and position to start immaterial. Address Box 628, care of Rock Products, 330 South Wells Street, Chicago, Ill.

EXECUTIVE, WITH THIRTY YEARS' EXperience covering purchasing, sales and management. At present, and for 14 years past, with concern producing gravel and sands for construction, foundry, blast and filter purposes. Age 53; married. Address Box 627, care of Rock Products, 330 So. Wells Street, Chicago, Ill.

A SUPERINTENDENT OR PRODUCTION manager for lime or crushing plant. Broad enough to handle several plants as a general superintendent. Wages in line with the depression. Address Box 626, care of Rock Products, 330 South Wells St., Chicago, Ill.

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H. J. BROWN
CONSULTING ENGINEER
35 Deane Street, Boston, Massachusetts.
Specializing in Gypsum Plants and in the Mining, Quarrying and Manufacture of Gypsum Products.
Consultation — Design
Examinations — Construction
Reports — Supervision

WE LOOK INTO THE EARTH
By using Diamond Core Drills. We drill for Limestone, Gypsum, Talc, Fire Clay, Coal and all other minerals.
PENNSYLVANIA DRILLING CO.
Drilling Contractors
Pittsburgh, Pa.

Try cloverine fertilizer all crops
H. D. RUHM
Consulting expert on phosphate matters. Correspondence solicited. Will advise as to use of and furnish all brands and grades of phosphates.
In the Mt. Pleasant Phosphate Field
305 West Seventh Street Columbia, Tenn.

DIAMOND CORE DRILLING
CONTRACTORS
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Light Gasoline Outfits
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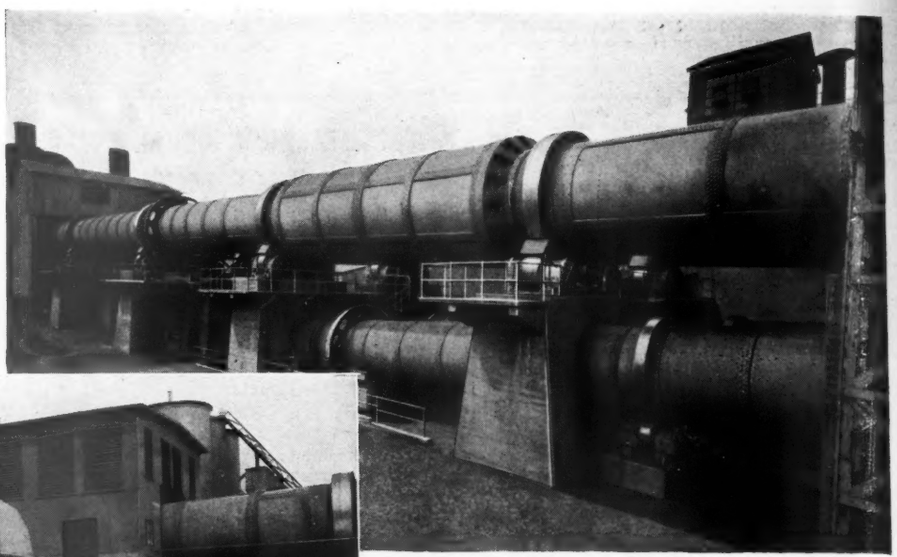
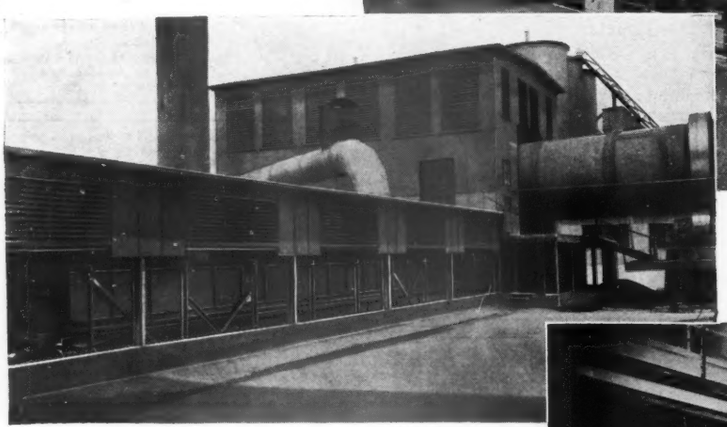
Plant Rehabilitation . . .

. . . the way to profits

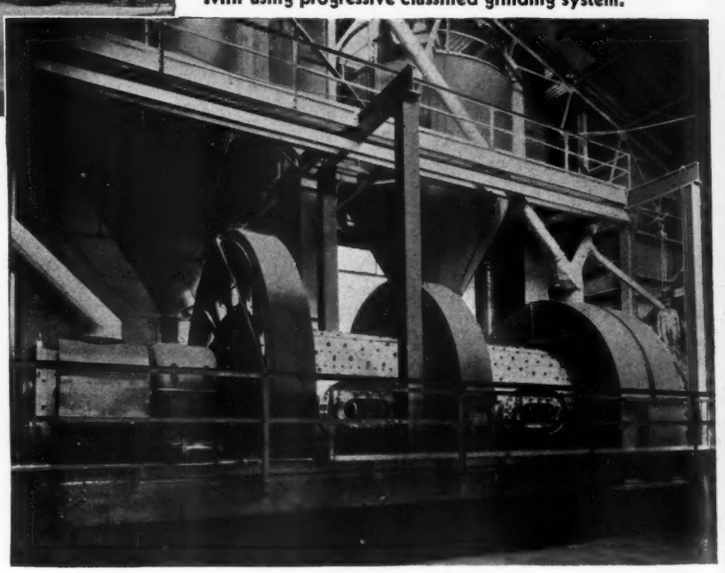


Right—11'-6" and 15' x 250', Four Support, Two Roller Type Kiln with enlarged calcining zone.



Left—4'-6"x80' Air Quenching Clinker Cooler handling output from 11'-6"x300' kiln.

Below—Dry Grinding Three-Compartment Compeb Mill using progressive classified grinding system.

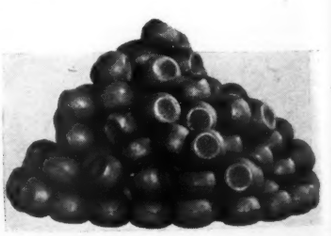


PLANT rehabilitation to obtain improved quality of product, and to reduce operating costs is "the way out" for many plants. In reconditioning existing machines the use of parts from the original equipment manufacturer is essential to assure the best results.

There are many cement plants in which substantial economies in grinding, kiln operation and clinker cooling are possible. Kilns with enlarged calcining zones result in fuel saving and a more uniform product. Air quenching clinker coolers, designed for rapid transfer of heat to cooling air, and the utilization of the recuperated heat, not only save money for fuel but also reduce grinding costs and produce better cement. Progressive grinding Compeb mills result in low power consumption, and permit a wide range of fineness control including the requirements of high early strength cement.

Modern kilns, coolers, and Compeb mills and grinding media, together with modern crushers, vibrating screens, centrifugal pumps and special motors . . . all contribute toward the production of better cement at lower cost.

Concavex are preferred for fine grinding by users who have conducted tests. You should try them. They are made of forged steel or air furnace iron.



ALLIS-CHALMERS

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